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VOL. VI.

LONDON:
JAMES NISBET AND CO. BERNERS STREET.

1856.

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LONDON:
Printed by G. Barclay, Castle Street, Leicester Sq.

PREFACE.

LIKE the clocks in the old German minsters, wound up for so many years, we have now accomplished our course round the dial; and this morning "Excelsior" strikes its last hour, and, after moving steadily over six-and-thirty months, to-day the index stands still.

Many urge us to wind the old clock up once more, and start on another round. But we made a promise, and we keep it. With subscribers so numerous and so friendly, it needs an effort to leave off; but from the moment we announced that these six volumes should be a self-contained series, our purpose was formed, and no effort has been spared to complete within the limits prescribed every subject in which our readers evidenced an interest. And now we deem it only good faith to bring our work to a conclusion, which we do with most grateful acknowledgments to the public and to those contributors who have done so much to gain for us its favour.

We are aware that a desire has very generally prevailed that a larger portion of our space could have been devoted to religious literature. In that desire none have sympathised more cordially than ourselves; and, now that the completion of this work has fulfilled our engagements, we purpose to bring out, in a uniform size, a series which, whilst an entirely separate and independent publication, may withal be accepted as a supplement to the present miscellany. To some extent "Our Christian Classics" will combine Biography and Church History with specimens from the master-pieces of our British theologians; and, whilst we hope that it may not be unworthy of the notice of the student and the scholar, our great ambition is that it may minister to the edification of the devout and earnest reader.

December 1, 1856.

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A Dutch Emblem.

EXCELSIOR.

EMBLEMS.

The picture now before the writer represents two mastiffs worrying one another, whilst a lean cur is running off with the bone. Such a picture tells its own tale. According to the mood of the moraliser, the dogs which strive for the bone may represent two litigious neighbours or two nations at war, and the dog that carries off the prize will in that case be a lawyer or a neutral power. The next picture to which we turn reads its lesson no less plainly. A spider is catching a fly, and a lizard is about to spring at the spider, and a stork is preparing to gobble the lizard, whilst a serpent is ready to sting the stork, and a man to kill the serpent. Many "wise saws and modern instances" are called up by the spectacle; but the designer has given it a turn more grave and suggestive by quoting Eccles. v. 8, "If thou seest the oppression of the poor, and violent perverting of judgment and justice in a province, marvel not at the matter: for he that is higher than the highest regardeth; and there be higher than they."

These pictures are Emblems. Through the medium of some well-chosen incident or object, they are intended to convey some important truth or moral lesson. To all intents they are pictorial proverbs, and as they not only entertain the eye, but as their somewhat enigmatical character makes a gentle demand on the observer's ingenuity, they have always been a popular mode of conveying instruction. Perhaps all the rather because they do not necessarily intrench on the doctrinal domain, they have long formed an extensive element in the literature designed for the laity of the Church of Rome. A collection published by Alciati, a learned lawyer, who died at Padua in 1550, has been translated into almost every language of Europe; and those of Benedict Hæften, a monk at Utrecht, in the following century, have been much admired. The pictures of Hermann Hugo, the Jesuit, have been appropriated by Francis Quarles to adorn his well-known verses; and Hugo's own excellent poetry was translated into English by Edmund Arwacker and was widely read in the reign of Charles II.

It is seldom that the Emblem is merely pictorial. Usually the author comes to the help of the artist, and in a pithy sentence or proverb, or, still more frequently, in a poetical ditty, he expounds the engraver's riddle.

The oldest English collection with which we are acquainted is, "A choice of Emblemes, and other Devises, for the most parte gathered out of sundrie writers, Englished and Moralized, and divers newly devised, by Geffrey Whitney. Imprinted at Leyden 1586." The cuts are primitive and very poor; but there is often much spirit in the verses. For instance, the engraving represents two men, facing one another, with three eyes lying on the ground between them. It would need Œdipus to explain it; but says old Geoffrey,—

"The gods agreed two men their wish should have,
And did decree who first demand did make
Should have his wish, and he that last did crave
The other's gift should double to his take.
  The Covetous wretch and the Envious man,—
  These were the two that of this case did scan.
They long did strive who should the first demand.
The Covetous man refused, because his mate
Should have his gift then doubled out of hand:
The thought whereof upon his heart did grate.
  Wherefore the gods did plague him for his sin,
  And did command the Envious man begin.

Who did not crave what Midas chief did choose,
Because his friend thereof the fruit should find:
But only wish'd that he one eye might lose,
Unto the end to have the other blind:
  Which being said, he did his wish obtain,
  So but one eye was left unto the twain.
See here how vile these caitives do appear
To God and man: but chiefly (as we see)
The Covetous man, who hurteth far and near.
Mere spiteful men their own tormentors be.
  But both be bad, and he that is the best
  God keep him thence where honest men do rest."

"Ex bello, pax," is a companion picture to Landseer's "War and Peace." It is a helmet which bees have converted into their hive,—originally a device of Alciati,—and the legend is,—

"The helmet strong that did the head defend,
Behold, for hive the bees in quiet serv'd;
And when that wars with bloody blows had end,
They honey wrought where soldier was preserv'd:
  Which doth declare the blessed fruits of peace,
  How sweet she is when mortal wars do cease."

Our next picture is a house, from an upper window of which a monkey is scattering handfuls of money into the street: an emblem of the ways in which fashionable wives and foppish heirs squander the miser's fortune:—

"An usurer who made his god his gold,
Within his house a peevish ape retain'd:
A servant fit for such a miser old,
Of whom both mocks and apish mows he gain'd.
  Thus every day he made his master sport,
  And to his clog was chained in the court.
At length it happ'd, while greedy grandsire din'd,
The ape got loose, and found a window ope,
Wherein he leap'd, and all about did find
The god wherein the miser put his hope;
  Which soon he broach'd, and forth with speed did fling,
  And did delight on stones to hear it ring.

The sight right well the passers-by did please,
Who did rejoice to find these golden crumbs,
That all their life their poverty did ease.
Of goods ill-got, lo! here the fruit that comes.
  Look hereupon, you that have Midas' mint,
  And be possess'd with hearts as hard as flint."

In the Civil War, George Wither sold his estate and raised a troop of horse for the Parliament. He was taken prisoner; but his brother bard, Sir John Denham, begged the king not to hang him, "because as long as Wither lived, Denham would not be accounted the worst poet in England." Of all the English writers of Emblems his works are now among the rarest, a perfect copy costing as much as six or eight guineas. His conceits are often happy, and his rhymes are fluent and pleasing. A squirrel is represented turning its tail, umbrella-wise, to a shower of rain, meanwhile munching a filbert, and Wither sings:—

"The little squirrel hath no other food
  Than that which Nature's thrifty hand provides,
And, in purveying up and down the wood,
  She many cold wet storms for that abides.
She lies not heartless in her mossy dray,
  Nor feareth to adventure through the rain;
But skippeth out and bears it as she may,
  Until the season waxeth calm again.
Right thus have I and others often far'd:
  For when we first into the world were brought,
We found but little for our use prepar'd,
  Save that which by hard labour must be sought.
In many storms, unheeded, we are fain
  To seek our needful things, and smilingly
To jest at what some others would complain,
  That none might laugh at our necessity.
Yea, some have lived on husks, whilst others fed
  On that which was their labour's due reward,
And were pursued till they were almost dead,
  Without the world's compassion or regard.

Yet, by enduring, they outlived the blast
  Of adverse fortune, and with good success
(Expecting calmer seasons) at the last
  Arrived at the port of Happiness.
All grief shall have an ending, I am sure,
And, therefore, I with patience will endure."

The picture of an archer suggests the following stanzas:

" When to the fields we walk to look upon
  Some skilful marksman, so much heed we not
How many arrows from his bow are gone,
  As we observe how nigh the mark he shot.
And justly we deride that man who spends
  His time and shafts, but never aim doth take
To hit the white, or foolishly pretends
  The number of the shots doth archers make.
So God, who marketh our endeavours here,
  Doth not by tale account of them receive;
But heedeth rather how well-meant they were,
  And at His will how rightly aim'd we have.
It is not mumbling over thrice a-day
  A set of Ave-Marias or of creeds,
Or many hours formally to pray,
  When from a dull devotion it proceeds.
Nor is it up and down the land to seek
  To find those well-breath'd lecturers, that can
Preach thrice a-Sabbath and six times a-week,
  Yet be as fresh as when they first began.
Nor is it such-like things perform'd by number
  Which God respects: nor doth His wisdom crave
Those many vanities wherewith some cumber
  Their bodies, as if those their souls could save.
For not much-doing, but well-doing that
  Which God commands, the doer justifies.
To pray without devotion is to prate,
  And hearing is but half our exercise.
We ought not, therefore, to regard alone
How often, but how well, the work is done."

The name, however, which in England we have learned to associate with Emblems is that of Francis Quarles. Like Alciati he was a lawyer, and like his contemporary Wither he suffered from the troublous times of Charles I.,—with this difference, that he was a Royalist. They both died in London. Quarles was buried in the church of St. Vedast, Foster Lane; Wither in "the Savoy." Like his Republican rival, Quarles was a very voluminous poet. The vignettes of his Emblems, as has already been mentioned, are chiefly copied from Hugo's "Pia Desideria," and those of his "School of the Heart" are taken from Hæften's "Schola Cordis;" but the poetry is entirely original. Both works have been remarkably popular, or, as Anthony à Wood expresses it, "they have been and still are in wonderful veneration among the vulgar." For that veneration, however, there is a deeper reason than could occur to the contracted mind of Anthony. Their charm is their piety. In pleasing numbers they express those feelings of which most devout spirits are in some degree cognisant, and the imagination is gratified whilst the heart is made better. As a critic, more profound because more genial than the crabbed Oxonian, Thomas Fuller, has said, "His *visible poetry* is excellent, catching therein the eye and fancy at one draught." And even those Cowley-like conceits in which his verses abound hardly offend us: they seem appropriate in Emblem-literature. We must be content with one specimen. The picture is a child in a go-cart, with the motto, "Hold up my goings in thy paths, that my footsteps slip not;" and the following is the poetry:—

"Whene'er the old exchange of profit rings
  Her silver saints'-bell of uncertain gains,
My merchant-soul can stretch both legs and wings,
  How I can run and take unwearied pains!
    The charms of profit are so strong, that I
    Who wanted legs to go, find wings to fly.

If time-beguiling pleasure but advance
  Her lustful trump, and blow her bold alarms,
O how my sportful soul can frisk and dance,
  And hug that siren in her twined arms!
    The sprightly voice of sinew-strength'ning pleasure
    Can lend my bedrid soul both legs and leisure.

If blazing honour chance to fill my veins
  With flatt'ring warmth and flash of courtly fire,
My soul can take a pleasure in her pains,—
  My lofty-strutting steps disdain to tire:
    My antic knees can turn upon the hinges
    Of compliment, and screw a thousand cringes.

But when I come to thee, my God, that art
  The royal mine of everlasting treasure,
The real honour of my better part,
  And fountain of eternal pleasure,
    How nerveless are my limbs! how faint and slow!
    I have no wings to fly, nor legs to go.

So when the streams of swift-foot Rhine convey
  Her upland riches to the Belgic shore,
The idle vessel glides the wat'ry way,
  Without the blast, or tug of wind or oar:
    Her slipp'ry keel divides the silver foam
    With ease; so facile is the way from home!

But when the home-bound vessel turns her sails
  Against the breast of the resisting stream,
O then she slugs; nor sail nor oar prevails;
  The stream is sturdy, and her tide's extreme:
    Each stroke is loss, and ev'ry tug is vain,
    A boat-length's purchase is a league of pain.

Great ALL IN ALL, that art my rest, my home:
  My way is tedious and my steps are slow:
Reach forth thy helpful hand, or bid me come;
  I am thy child, O teach thy child to go:
    Conjoin thy sweet commands to my desire,
    And I will venture, though I fail or tire."

Of all our English authors there is no one from whom we should have so readily expected these "dainty devices" as the great Christian allegorist. And we have them. "A Book for Boys and Girls; or, Temporal Things Spiritualised," is a little book of Emblems by John Bunyan. The talismanic touch of the mighty tinker may be perceived in sundry passages; but quaint, sensible, and homely as they are, it is scarcely fair to treat them as poetry.

"*Upon the Frog.*

The frog by nature is both damp and cold,
Her mouth is large, her belly much will hold;
She sits somewhat ascending, loves to be
Croaking in gardens, though unpleasantly.

Comparison.

The hypocrite is like unto this frog,
As like as is the puppy to the dog.
He is of nature cold, his mouth is wide
To prate, and at true goodness to deride.
He mounts his head as if he was above
The world, when yet 'tis that which has his love;
And though he seeks in churches for to croak,
He neither loveth Jesus nor His yoke."

"*Upon a Penny Loaf.*

Thy price one penny is in time of plenty,
In famine doubled, 'tis from one to twenty:
Yea, no man knows what price on thee to set,
When there is but one penny loaf to get.

Comparison.

This loaf's an emblem of the Word of God,
A thing of low esteem before the rod
Of famine smites the soul with fear of death,
But then it is our all, our life, our breath."

"*Upon the Fish in the Water.*

The water is the fish's element;
Take her from thence, none can her death prevent:
And some have said, who have transgressors been,
As good not be as to be kept from sin.

The water is the fish's element;
Leave her but there, and she is well content:
So's he, who in the path of life doth plod;
Take all, says he, let me but have my God.

The water is the fish's element;
Her sportings there to her are excellent:
So is God's service unto holy men,
They are not in their element till then."

The most recent work of this kind with which we are acquainted is an American publication, "Religious Emblems and Allegories," by the Rev. W. Holmes. The engravings are in the most humble style of art, but the accompanying poetry and prose are sensible and scriptural, and sometimes ingenious.

But the great magazine of this kind of literature is locked up in the language of the Netherlands. With the works of Cats, Spinniker, Hesman, Hoogstræten, Heins, Elger, De Brune, Nerrincq, Poirters, Luiken, Houbraken, Bogaert, and others, in Dutch and Flemish, besides Reifenbergius, Camerarius, Schoonhovius, and many more in Latin, it would be possible to form, as some friends of ours have formed, a very curious, but withal a very costly library. On some future occasion we may give our readers a specimen of the incomparable Cats. Meanwhile, the present number contains a design taken from a Dutch book of Emblems; and should any modern Quarles feel moved to "quicken" it into poetry, we shall be happy to present his version to our readers. H.

THE DULL WATERING-PLACE.

"Not to Hastings, my dear aunt; do not let us go to Hastings!" exclaimed a tall young girl, running up to her aunt, who was reclining in an easy chair by the fire one evening studying "Bradshaw's Railway Guide" with much attention.

"And why not to Hastings, Eleanor?" asked her aunt. "I should have thought it just the kind of place you would particularly like."

"Oh, aunt! how can you say so?" said the young lady, rather reproachfully. "Don't you remember what the people who were here last week said about it?—That it was the dullest place they ever were at in their lives. They called it *insufferably* dull. I remember the expression perfectly, for I thought it so strong."

"It was certainly a sweeping observation," remarked Mrs. Mortimer, laughing. "But who were those people, Eleanor? for, to tell you the truth, I have quite forgotten all about them. Stay a moment, though! I think I know whom you mean. Lady Charlotte Lennox and her daughter—eh?"

"Yes, aunt. And have you really forgotten what they said about that wretched Hastings?"

"Quite, Eleanor; but you have not, so tell me all about it. I am just now in a pleasant, dreamy condition, in which listening is particularly agreeable. What did they say?"

"They said the place was so stupid, it was impossible to say *how* stupid, and horridly vulgar ——"

"I wonder whether Lady Charlotte Lennox and her daughter ever learnt the Lord's Prayer, the Belief, and the Ten Commandments in the *vulgar* tongue," interrupted Mrs. Mortimer, with her eyes shut.

"Aunt, you are half asleep, and still laughing," said Eleanor. "I wish I had not told you about the 'vulgar,' for I remember how you quiz the word. But never mind about that. They said, besides, that Hastings was a most uninteresting place—that there was nobody there—that there was nothing to be seen there—nothing to do—nothing going on,—in short, 'insufferably dull' comprehended the whole."

"And a frightful whole, too!" exclaimed Mrs. Mortimer, putting her hands over her ears, as if to shut out the sound. "Not a word more, I implore you, my dear child. I would not take you to such a place as you have described for all the world, neither would I go myself: I should be miserable; and as for your poor uncle—still, to be sure, *he* would take his occupation with him—but such a place is not to be thought of. Dear me!" continued Mrs. Mortimer, after a short pause, "how Hastings must have altered since I was there! The Butlers and Sweetloves lived there then. But I daresay they are dead and gone now, and everything is changed."

"Who were the Butlers and Sweetloves, aunt?" inquired Eleanor. "Two families that you knew?"

"Yes, my dear."

"Nice ones, aunt?"

"Very amusing ones, my dear."

"I wish they were there now," sighed Eleanor.

"I should wish so, too," observed Mrs. Mortimer, "if we were going to Hastings; but if we are not, it cannot much signify who lives there, I should think."

Mrs. Mortimer spoke this very slowly, for she really was getting very sleepy, indeed.

"My dear aunt, do have a nap," cried Eleanor, "and I will wake you at the end of half-an-hour."

"Thank you, dear, I really think I must; so good night for a little bit;" and so saying, Mrs. Mortimer shut her eyes, and was soon fast asleep.

Eleanor gazed for a few moments at the fire; then she got up and lit a candle and opened a book, but she discovered that she was unable to read, her thoughts were so unsettled. She was thinking about what Lady Charlotte Lennox had said. She had found, in the course of repeating it to her aunt, that it sounded very silly and unmeaning, and she began to wonder whether Lady Charlotte Lennox's opinion was correct or not. She wondered very much, too, who the Butlers and Sweetloves were, whom her aunt thought such amusing people; whether they really were dead and gone, or not; whether Lady Charlotte Lennox knew them or not: but *that* she could find out from Miss Lennox next time she saw her. She felt sure her aunt had been laughing to herself, and she wondered why.

And so she went on with her thoughts and wonderings, but not in perfect idleness, by any means, for she had taken up that great resource of women, needlework, when the thinking-fit came on; so she sat hemming, as well as thinking, for at least half-an-hour; at the end of which time she began to long to talk again; and after looking at her aunt several times, she at last addressed her,—

"Aunt!"

"My dear—yes—are you there?" asked Mrs. Mortimer, awaking.

"I have been here ever since, aunt, working away, and thinking about Lady Charlotte Lennox and Hastings."

"Oh, do forget them as fast as possible, there's a good girl!" cried Mrs. Mortimer, rousing up. "What *can* be the use of thinking about anything so 'insufferably dull' as—*Hastings*, I suppose I meant to say," added Mrs. Mortimer, with a smile, "not Lady Charlotte Lennox, of course! Nay, my dear, you need not look at me so inquiringly. I am not in the habit of calling either people or places 'insufferably dull.' Everything and everybody has an interesting side, even —— But, come! let us forget all about it, and do you take the 'Bradshaw' and amuse yourself by looking out for another place to go to."

And so saying, Mrs. Mortimer leant back in her chair once more.

Eleanor took the "Bradshaw," and opened the map, and read to herself a number of names; but, of course, this was all she could do.

"There's no use in my reading a quantity of names, aunt," she observed at last, in rather a deplorable voice; "I know nothing about any of the places: I wish I did. Don't *you*, aunt? I feel sure, indeed, that you must. You must have been to other places on the south coast besides that tiresome Hastings. How sleepy you look! but you really must not go to sleep again, for my uncle will be coming back soon to tea. Do wake up, and give me a description of some other places."

"You are very ingenious, Eleanor," replied Mrs. Mortimer; "but supposing that I were to do what you ask, and enchant you by a description of some place I like, and then that to-morrow another Lady Charlotte Lennox were to call and tell you it was as 'insufferably dull' as Hastings, and *so* stupid—she couldn't tell *how* stupid—what should you do?"

Eleanor laughed.

"Now you are bringing back the conversation to Lady Charlotte Lennox yourself, aunt!"

"So I am, I declare!" said Mrs. Mortimer; "but I had no intention of doing so. It is because I am half asleep, I should think."

"Not a bit of it, aunt! You are shamming now, for I see you can hardly help smiling all the time. So do begin and tell me a long story about some nice place or other, to put—you know what—out of my head."

"Well, but on one condition, Eleanor," said Mrs. Mortimer.

"What is it, aunt?"

"Why, that if you *really* like and believe my description, you do not take a dislike to the place from any other people's remarks about it."

"Indeed I will not."

"Good! Now, then, take up your work and listen very attentively, for I am going to be very exact and correct; and you may ask me any questions you please, as we go along, only I shall not tell you the name of the place just yet."

"This is charming!" exclaimed Eleanor, seating herself very near the easy chair in which Mrs. Mortimer was once more leaning back, as if determined to be as near going to sleep as possible.

"Are you ready, Eleanor?"

Mrs. Mortimer's eyes were shut.

"Ready and waiting," laughed her niece.

"Well, then," said Mrs. Mortimer, looking round with pleasure at the good-natured smile that lit up her eager niece's face, "once upon a time, there was a beautiful old town, in the midst of which stood a venerable ruined castle ——"

"*Dover*, aunt!" shouted Eleanor, as quick as lightning.

"As you please, my dear. I thought I had protested against telling the name at present."

"I beg your pardon, dear aunt, but I feel that it *must* be Dover; and I am so much pleased, I don't know what to do. We shall see Shakspeare's Cliff,—and the French coast, and, perhaps,—oh, perhaps, aunt,—actually, don't you think my uncle will consent to make a trip across the Channel and touch French soil, and if so ——"

"Good night, Eleanor," interrupted Mrs. Mortimer.

"Aunt!" exclaimed Eleanor.

"What, my dear? You don't want me, I am sure. You are telling all the story yourself."

"No, no, no! I won't speak again; only why *did* you talk about the old castle?"

"Because there *is* an old castle at the place I mean."

"Pray go on, aunt; I will be as quiet as possible."

"Well, then, this old ruined castle stands on the top of a high cliff; and the high cliff faces that grandest sight of nature—the everlasting ocean; so that it is quite a wonder to me that the warders, who, in olden times, used to walk up and down the battlements, and blow their horns amidst the roar of the waves, and often through the howling of the tempest, did not one and all become illustrious poets."

Eleanor smiled, and laid her finger on her lips, enjoining silence on herself. Mrs. Mortimer answered her look.

"I dare say you would like to know whether the castle is a beautiful one now, Eleanor. No! there are but a few imperfect traces of it left. No decay, however, can alter the grandeur of the situation; and as you look down from those fine heights, imagination can do as much, or more for you, perhaps, than the reality would have done; for certain it is, that in the days when castles were in their most romantic and magnificent state, neither the owners nor the warders took the picturesque and poetical view of them that you and I do now."

"How was that, I wonder?"

"It is difficult to say, only we know that as

'Distance lends enchantment to the view,'

so it softens down all the asperities and deficiencies which disturb the perfection of every scene we contemplate closely. Looked at from afar, we see nothing but the romantic features of those early days of civilisation; whereas the practical working of them may have been so rough and harsh, that neither poetry nor romance had a chance of flourishing among them.

"Certainly, as regards my old castle, we must content ourselves with what it was rather than what it is; for it is a very tumble-down affair, indeed; and then a somewhat unromantic fate has befallen those venerable remains of former grandeur. They have been turned into tea-gardens by the ingenious inhabitants of the place."

Eleanor uttered an exclamation at the idea of such a desecration.

"Aye, that's all very well, my dear," observed Mrs. Mortimer, "viewing the thing romantically; but now, Eleanor, let us take a peep at the other side of the picture; what you would be inclined to call the merely practical side. Think, now, of the comfort and pleasure those tea-gardens afford to quantities of people who work hard most of their lives, and only now and then get a holiday in which to enjoy themselves. Many and many a gay party spend an evening of enjoyment on that beautiful spot, who would otherwise never have seen it, except, perhaps, once in their lives, just to walk round it, staring at the untidy, and, to them, unintelligible remains of antiquity, with vacant faces and puzzled minds. If even the old possessors of the castles themselves never viewed them through a poetic halo, how can you expect the working millions of a decidedly unpoetical state of society to do so? But no matter. The place is comfortable, free from nettles, and nicely kept, and the tea-arbours are as snug as little birds'-nests; open, too, only to the southern sunny sea; and Darby and Joan sit there in unlimited enjoyment, sipping their cup of bohea, while their little ones climb about the ruins and fancy themselves wandering heroes, or fancy nothing at all but enjoyment. And to tell you the truth, Eleanor, I suspect that could we get far enough from such a scene, to view it through the true poetic haze, we should look upon it as almost a more poetical and more touching phase of castle life than even the old knight-and-warder times. Then, too, look what an original idea even for us, to be drinking tea in a tea-arbour amidst the ruins of an ancient fortress!"

"Not a word of joke, dear aunt," cried Eleanor. "Your picture is a real one, and there is real, real poetry about it. I fancy I see the jovial little parties you talk of, and—and—aunt, do you know, I now feel quite selfish for always thinking first and foremost of some nonsense of my own."

"Your thoughts were natural ones in this case, my dear; that is to say," added Mrs. Mortimer, smiling, "natural for a young lady fresh from reading Walter Scott's Romances and Gray's Odes. But now you perceive the truth of what I was saying before; namely, that everything, and everybody, and every place (with perhaps the one exception of Lady Charlotte Lennox's *bête noir*, Hastings), has an interesting side to it. If you can't see it, the fault is more likely to be in you than in the thing looked at. At scenes such as I have described, the Lady Charlotte Lennoxes of the world would turn up their pretty noses in disgust. Yet it is from scenes such as these that the Goldsmiths and Lambs gather materials for their most beautiful essays and most vivid descriptions. But I am weary, Eleanor. We have had enough of the old castle. You shall descend with me now to the town and the Parade."

"Oh, do spare me the Parade, aunt!" cried Eleanor. "I know you are very skilful; but how can anybody make a Parade interesting? Parades, at all events, are not to my taste."

"You are very troublesome, my dear," remarked Mrs.

Mortimer. "But you really must go my way, and my way leads along the Parade to the fishing-boats."

"The fishing-boats, by all means, aunt."

"Very well. But the Parade lies *en route*, and let me tell you there is a great deal to be learnt there."

"Oh, about how to dress, and how to hold oneself, I suppose you mean, aunt. Pray go quick over that part. It may be very necessary to know, but it cannot be interesting."

"You are the worst guesser to-day that I ever listened to, Eleanor; I really had no thought about such matters, for I question if my Parade be a very first-rate school for such accomplishments. No, my dear child; my remembrances of what is to be learnt on the Parade are of a very different kind. Look! I shut my eyes and recollect; and now I see before me on that straight, stiff walk, two Bath chairs, drawn slowly along, one behind the other, by chairmen. And, as if it were only yesterday, I recall the pang that shot through my heart when glancing at those chairs as I passed them, I beheld in them two sisters: costume—size—age—so nearly, if not exactly the same, that it was almost impossible to distinguish the one from the other. Alas! and the same fell disease was evidently at work upon them both! It had robbed their cheeks of bloom and wasted their flesh, and sunk their large, dark, melancholy eyes. It was only on warm sunny days they ventured out, and then always together, and in that manner. I never saw father or mother with them, and they were no longer girlishly young. It was a piteous sight, and yet this was but one among many of a similar description. What do you think of my Parade now, Eleanor?"

The tears stood in Eleanor's eyes as she answered, "It must be a very melancholy place, aunt; I cannot think how you can like it!"

"I did not say *I liked it* exactly," replied Mrs. Mortimer, now sitting upright in her chair; "but I *dis*like a great deal more the morbid fastidiousness which makes people run away from these so-called sad realities of life, as if they had nothing to do with them! Illness and death are the certain lot of all of us, at *some* period of our lives; and I really think we are shutting our eyes to what may be justly called a 'means of grace,' if we uniformly cross over to the other side, when any of these examples of our common mortality cross our path."

"But you can hardly call it their crossing our path if we go to a place where we know invalids are sent, aunt."

"Then, my dear, we must at once give up all thought of going to a fine warm climate ourselves; for wherever that great blessing is to be met with, there assuredly will you be apt to find invalids."

"Go on, aunt, I understand. And the soft air we go to for restoration of strength, they go to for ——" And Eleanor covered her face with both her hands.

"For *Euthanasia*, Eleanor, but do not be distressed. It is but the ending of the journey we are all upon, rather sooner than usual.

"'A little earlier or later, dearest,
What matters it? . . . .'*

"And we who live need such sights, not only to remind us of mortality, but to arouse us to gratitude for the blessing of health still allowed to ourselves. You, in the first bloom of youth and strength, may well, on looking at those fair young creatures fading away, utter a prayer of thankfulness, which would probably have been left unsaid, and even unthought, had not the painful spectacle before you warmed up in your heart the dim flame of gratitude. Ah! from day to day w all of us, more or less, overlook daily blessings; and of none are we much more forgetful than of health.

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* "Eine Minute früher oder später,
Was macht das aus?"

OEHLENSCHLÄGER'S *Coreggio.*

"My dear niece, when we think of the trivial commonplaces which fill our poor heads from one week's end to another, ought we not to be really *glad* of anything which raises our ideas a peg or two higher in the scale? In short, anything which calls the hard-hearted to tenderness, the frivolous to seriousness, and all to gratitude, must be to be desired rather than to be shunned. But now I have said enough. There were many lively scenes as well as sad ones on that Parade, Eleanor. Persevering little boys with indefatigable hoops, gay ladies and gambolling children, and now and then a travelling astronomer, who, for a very small consideration, allowed you to look through a telescope at the spots on the sun. But whether the spots were on the sun, or on the glasses of his telescope, was a point very difficult of determination. Then, too, it was on the beach, close under the Parade, that any curious sights were sure to be exhibited. I remember once a huge beam of wood, three yards perhaps in length, being brought ashore covered with barnacles so thickly, that they clung to it, and hung round it, like ornamenting fringe. On another occasion there was a still greater curiosity. A large animal called a polypus,—a dreadful-looking, shapeless lump of flesh, with a number of long fleshy arms, underneath which were two rows of suckers, arranged along the whole length of the arm like buttons. If you put your finger for a moment on to one of these suckers, you felt it drawn closer in, and rejoiced in withdrawing it as quickly as possible. Report said, that the polypus had power to sink a boat, by using the combined strength of all the suckers on his arms to draw it down! At all events, the beast was a very curious and frightful one, and was thought such a rarity, that the people who had taken him, pitched a tent for him on the beach, and charged sixpence admission to visitors, anxious to view him in his captured state, in a large tub of salt-water. Poor creature, he died after a two days' exhibition!

"Now, Eleanor, I begin to be as tired of the Parade as of the Castle. So let us move on. At one end of it you descend by a flight of steps to the beach, and at once find yourself in a different world. No more ladies, either sick or gay,—no more astronomers, nor showmen. But sailors, boats, fishmongers' stalls, nets spread out to be dried or be mended, windlasses drawn up by patient horses, men, women, and children, all busy or idle over some pursuit connected with fishing, fishing-tackle, sails, and ropes. And here I am completely puzzled what to choose for your amusement."

"You can't mean that there is nothing amusing there. If you were to say that, I couldn't believe you, aunt."

"But I said nothing of the kind. On the contrary, my difficulty is among so many interesting things, to guess which you would prefer me to talk about."

"All, aunt."

"Aye, but there is such a thing as a choice too. For instance, if you are fond of sketching, I should never get you away from those noble dark boats, built for hard seas and rough landing, and the earringed fishermen lounging about them. You would be finding more studies than a month's stay would enable you to complete, and would go into extravagant raptures over certain tall, narrow, wood-planked houses, blackened with pitch, which are run up as a shelter for the coils of ropes and sails. The effect of these slim, dark cots, when caught in contrast either with the grey cliff or the blue sky, is so remarkable, that no one with half an artist's eye could fail to remark it. To a sketcher, therefore, I should bid good-bye for the day, if I once got one there. But how is it with you, Eleanor? shall we go on?"

"On, at all events now, though the idea of that scene would be perfectly enough to make me long to go to the place, even if it contained nothing else, and was as stupid as Hastings."

"Good! Now setting aside the picturesque appearance of these sailors, they are a very curious race. Their fathers were most of them genuine smugglers, and the sons in their early youth have shared in some of those forbidden adventures. Only mention the word smuggling, and you see such a curl of the lip and suppressed smile, as betray what a mine you are treading upon. I remember one who was out with your uncle and myself in a boat one day, whom your uncle encouraged and coaxed until he told us wonderful tales of his early days. Impudent escapes, and the landing of kegs of illicit spirits in spite of the utmost vigilance of a very vigilant coast-guard, who in one particular case fairly outwitted themselves. The man rowed us in sight of the very spot where the adventure happened. The smugglers had discovered that their intention of landing the spirits *somewhere* had been detected, so they sent off two or three decoy boats, with a few men in each, to different places where it was likely they would be expected to land, and having in this manner lured away to various places the whole of the preventive staff, they made at once for the now deserted preventive station itself, a house lying in a hollow between cliffs. And there they actually landed their booty and made their way through the preventive officers' gardens, carrying the kegs triumphantly with them into the country, and actually cutting some of the best cabbages in the garden as they passed through, as a *bonne bouche* for supper! You should have seen the sailor's grin of exultation as he related this feat, and, despite all my loyalty and love of submission to constituted authority, I found myself so deeply interested for the fate of that smuggling expedition, that I breathed freer again when I found how satisfactorily successful it was."

"Oh, I don't wonder a bit, aunt! There is surely nothing so very wrong in smuggling, after all."

"You mean that buying and selling spirits without paying duty to the king of your country is not forbidden in the Ten Commandments?—Eh, Eleanor?"

"Well, I suppose that is what I do mean. It seems to me to be quite different from any real sin like murder."

"That is, of course, what smugglers think, and that is the argument I have heard them use in defence of their trade, —that there is nothing really wrong in it."

"Nor is there. Is there, aunt?"

"If we were solitary and not gregarious animals, I should say, no, too, Eleanor. But inasmuch as for mutual convenience and happiness we agree in living together under a social system, we are bound by the laws of that system even when they forbid our doing things not in themselves wrong; that is, not expressly forbidden by the laws of God."

"But supposing there is injustice in thus forbidding those things, or that it was a stupid error in judgment?"

"But who is to judge of that, Eleanor? Not each individual for himself, surely! All social systems consist of some who rule and others who obey. If you dislike the system under which you were born, you are no slave; you are free to go away and choose another system and other rulers. But wherever you pitch your tent, and receive the advantage and protection which a civilised social system affords you, there you are bound, in return, to yield obedience to constituted authorities and laws. If it were free to every member of a community to pick and choose which law it suited him to obey and which to break, a nice mess we should have in lieu of a social system. Scarcely two neighbours in a street would agree in what they would obey and disobey, and the system would soon get as many black marks of disapprobation upon it as as the painter's picture."

"What was that, aunt? I have forgotten, if I ever knew."

"I think you must have heard the story; it is so old. Disgusted with the absurd criticisms of ignorant judges, an old painter once offered one of his finest paintings to public inspection, announcing that every one was at liberty to make a black charcoal cross on any part of the picture which was considered faulty and wanted correction. The room was thrown open, and the painter absented himself; but, when he returned at night, the whole picture was a mass of black charcoal crosses, not a bit of the painting could be seen! Everybody had found fault with something. If you had been the painter, how should you have felt, Eleanor?"

"In despair, I think, aunt. Among so many people there must have been some good judges. I should really suppose the picture must have had a great many faults. Do you know how the painter felt and what he did?"

"He took a handkerchief and wiped the whole of the black charcoal crosses out, Eleanor."

"My dear aunt! and did not make one correction?"

"Not one. But the next day he offered the picture to public inspection once more, requesting his kind friends, the judges, to put a white chalk cross on any part of the picture which they particularly admired, and felt sure was particularly good. I need not go on. You can guess the result, I am sure, with your lively imagination."

"Why, you don't mean, aunt——" And here Eleanor hesitated, and then laughed outright.

"Yes, I do, though. The picture was as white the second night as it had been black the first; and so much for variety of opinion, Eleanor! I assure you, it would never answer to give up social systems, any more than pictures, to the chimerical whims of the multitude. And being bound to obey the laws of that particular social system under which we shelter and live, we certainly do sin in breaking through those laws, even when the law is not one laid down in the Decalogue. The sin may not be of that heinous character which theft and murder involve, but we must not grumble that it lays us open to temporal punishment; nor forget either, that submission to rulers is one of the virtues which our Saviour both enjoined and practised.—But, really, Eleanor, we must talk of something else. Everything makes me sleepy after a time. I am as tired now of the smugglers as I was of the old Castle and the Parade. What comes next?"

(*To be continued.*)

LIFE'S LESSON.

"Books in the running brooks."—SHAKSPEARE.

UNDER the bowering honeysuckle,
By purple bells of shaking heather,
And brambly spines that closely buckle
Thick-leaved chains together,
As the sunshine plays
Where the lily strays
On its stream,
Netting a gauzy maze
Where the shingles gleam,

Flitting in cressy nook
Which the forget-me-not
King-cup and hare-bell dot,
How the glad little brook,
Sparkling along,
Singeth in joyous measure,
Toned by its own sweet pleasure,
Music's song!

Under the night's gloom, black and starless,
When the old forest-beeches near its
Darkling flood like trees are far less
Than like shadowy spirits,
Though the sunlight's gone
That so sweetly shone,
And the flowers
Died, as the night came on,
With the golden hours;
Though the blossom and beam,
Though the love and the light
From the glamour of night
Have deserted its stream,
How the lone rill,
Chilled and forsaken—listen!—
Makes, though no starlight glisten,
Music still!

X?

MICE "THAT MAR THE LAND."

There are many kinds and species of mice in this world, and most of them when they swarm, as they are apt to do at times, become very destructive to the property of man. One of the most celebrated, beginning with the northern parts of Europe, is the Scandinavian lemming (*Myodes lemmus*), which is handsome enough, with its variegated black and yellow fur. This creature occasionally migrates, and, at such periods, countless hosts of lemmings march in a straight line, regardless of river or mountain, stackyard or barn, and devastate the country in a way that cannot be estimated in our happy lemmingless land. There is the hamster too (*Cricetus vulgaris*), a creature much larger than our rat, with pretty white feet, and a white spot on the throat and breast, its variegated yellow back contrasting with the uniform smeared black furring of the under surface. This large "mouse" hoards up grain to an extent that may be imagined, when we are told that its hole is seven feet deep, and that these holes are filled to the brim by this diligent and industrious creature. Where it is found it is generally common, and woeful are its ravages in a corn-producing district. In the "Fauna Boreali-Americana," Sir John Richardson introduces us to several species of burrowing, mouse-like rodents, some furnished with cheek-pouches,—fit receptacles for the stores of food which they carry off.

The mouse of Scripture (*âchbor*, Lev. xi. 29) was one of "the creeping things that creep upon the earth," and the name evidently seems to have included many different but allied creatures.* The "mice that mar the land" proved a dire calamity to the heathen Philistines, when even "the priests and diviners" of those enemies of the Jews counselled their fellow-worshippers, to "make images" of them; "and ye shall give glory unto the God of Israel, peradventure He will lighten His hand from off you, and from off your gods, and *from off your land*" (1 Sam. vi. 5). In one of the cases of the Egyptian Gallery in the British Museum are images of a little shrew, or mouse-like animal, interesting as showing the similar religious habits of the great adjoining nation to Philistia. These images were dedicated to the god Horus.* The mouse was "unclean," and yet one of the sins in which the Jews indulged in the days of Isaiah (Isa. lxvi. 17) was in "eating swine's flesh, and the abomination, and *the mouse*." Some travellers imagine that the animal, here alluded to, must be the jerboa,—that curious rodent, with the long hind-legs, which jumps away on its flying stilts before them, as they disturb its solitude in the root-abounding plains and hills of Palestine. This creature (*Dipus Ægyptius*) is still eaten by the Arab, who stops most of its burrows, and coming at night entraps the jerboa, as it tries to escape by a hole over which he has spread a net.

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* See note to Bagster's Comprehensive Bible. In confirmation of the accuracy of this note, Mr. Deutsch, of the Library (British Museum), informs us that *akabiru* (Kam) plur. is an old Arabic word, evidently the

Dr. Rüppell† tells us that there are many rats and mice

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same as *âchborim*, the plural of *âchbor*. It is the male of the *jarbuon*, the jerboa (*Mus jaculus*, Forsk = *Dipus Ægyptius* of modern authors). The word is not found in modern Arabic dictionaries. In the Arabic Bible *jarbuon* only occurs in Isa. lxvi. 17. In Lev. xi. 29, the word is *fâron*; and in 1 Sam. vi. 5, &c., it is *djuradhon*. In the Vulgate and Septuagint *mus* and *μυς* occur in all the three places. See Walton's Polyglott. The word seems composed of two, meaning *to devour* (*araka*) or *eat*, and *grain* or *corn* (*bâr*).

* Mr. Birch has figured one of these bronzes nearly seven inches long (fig. 100) in his "Gallery of Antiquities, selected from the British Museum," p. 52.

† "Über Saugethiere aus der ordnung der Nager," Museum Senckenbergianum, iii. 105, &c.

in Egypt: our *Mus rattus* is abundant in the houses of Cairo, where it is as "restless" as our "rotten," the "squeak" of which is so well characterised by Burns. The black rat, feelingly and often comically introduced by Mr. Waterton in his "Essays," seems to be common in the streets and canal borders of that African capital; while its larger neighbour, called by the naturalist of Walton Hall the Hanover rat (*Mus decumanus*), the brown or Norwegian rat, the most abundant in London, confines itself to corn magazines and to ships on the Nile. We may mention that "the trade" in Paternoster Row, who, from crowded storeys upon storeys of books in quires and in boards, are forced to keep some of their stock in sunk floors, have found that books are left untouched by these gentry, provided the books are so arranged as to allow the rats to run between literature and the wall. Our readers may thus learn a lesson, and need fear nothing from the literary excursions of the "restless rottens," always provided they take similar precautions with those of the prudent proprietors of Paternoster Row. Rüppell figures several members of the rat tribe in the work we have cited. Some of the species (see his *Heterocephalus* and a species of *Rhizomys*, figured on plate viii. f. 1 and 2) have most redoubtable gnawing heads. Maginus, quoted by the learned Samuel Bochart,* alludes to fields in Palestine being almost deserted, on account of the abundance of mice and shrews, which were preyed upon by some birds, so that, but for their presence, the seeds would have been quite destroyed.

The long-tailed field-mouse (*Mus sylvaticus*) is certainly the very mouse immortalised by the poet Burns, "on turning one up in her nest with the plough, November 1785."†

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* "Hierozoicon," I. lib. iii. cap. xxxiv. p. 1018.

† "Poems, chiefly in the Scottish Dialect," p. 196 (1787).

The picture of the nest,—

> " O' foggage green . . .
> That wee-bit heap o' leaves an' stibble,
> Has cost thee monie a weary nibble ;"

and the situation where the Ayrshire bard met with the

> " Wee, sleekit, cowrin', tim'rous beastie,"

leave no doubt as to its identity.

This species is of a reddish-brown above, and white beneath; it has long ears, and a tail nearly as long as the head and body. It is scattered, observes Professor Bell,* "over almost the whole of the temperate parts of Europe, and in every part is considered as one of the most destructive of all the minor pests of the corn-field, the nursery-ground, and the kitchen-garden." It is excessively prolific, and as each specimen lays up a good supply against winter in its retreat, the devastations which this mouse commits are almost incalculable. This food consists of acorns, nuts, corn, and various seeds and roots. Pennant says, that the chief damage done to our fields results from the swine grubbing up the ground with their sinewy noses to get at these subterranean stores.†

Notwithstanding its depredations, it is a gentle and timid little creature, which is easily tamed, and soon learns to be friendly. Professor Bell says, "I have seen several of them running out upon the breakfast-table of my late most valued friend, Dr. Leach, of whose kind and affectionate disposition they appeared to have an almost instinctive perception, as they would feed from his hand or from his plate without the least fear, and allow him to handle and play with them as freely as the dormouse."

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* " British Quadrupeds," p. 305.

† See " Excelsior," vol. iii. p. 155. It is not unlikely that the boar of Syria may grub up the ground for stores of field-mice as well as for roots.

The naturalist, therefore, as well as the poet, has a word to put in for poor little *Mus sylvaticus*, whether running over the breakfast-table in his well-remembered apartments connected with "old Montagu House," in Bloomsbury—the British Museum—as it existed some ten years ago, or as starting away "wi' bickering brattle" from under Burns's plough, in a field of Mossgiel farm in Ayrshire, with its

> "Low roof with green trees half concealed,
> . . . . the very field
> Where Burns ploughed up the daisy."
> (WORDSWORTH, v. p. 243.)

How true, and affectionate, and simple, are his reflections!—

> "I'm truly sorry man's dominion
> Has broken Nature's social union,
> An' justifies that ill opinion
> Which makes thee startle,
> At me, thy poor, earth-born companion,
> An' *fellow-mortal!*"

A few lines, teeming with incident, with description, and with moral, expressed, too, by a manly and keen-eyed observer of nature, may help to decorate the more hard, though not less matter-of-fact compilation of the naturalist,—

> "I doubt na, whyles, but thou may thieve;
> What then?—poor beastie, thou maun live!
> A *daimen-icker* in a *thrave**
> 'S a sma' request:
> I'll get a blessin' with the lave,
> An' never miss't!"

Familiar though the majority of our readers may be with Burns's lines, there are some to whom they may be comparatively unknown, and for their sake, and to please those who have sympathy in any measure with a mind which "welled up" with kindly feeling to every animal and plant around him, we venture to quote the last stanza, but one, of that little masterpiece,—

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* "Daimen-icker,"—an ear of corn now and then.

> "But, mousie, thou art no thy lane,
> In proving *foresight* may be vain:
> The best-laid schemes o' *Mice* an' *Men*
> Gang aft a-gley,
> An' lea'e us nought but grief an' pain,
> For promis'd joy."

We have, in our land, another exceedingly destructive field-mouse, belonging to the same genus as the water-rat. It is a round-muzzled creature, with a short hair-covered tail and little round ears, and has altogether a neat and not very "mouse"-like aspect. Naturalists name it *Arvicola agrestis.* This creature, which occasionally becomes very abundant, is one of the most destructive enemies against which the farmer and storekeeper of corn have to battle. Professor Bell remarks, that "whilst the field-mouse confines itself principally to drier situations, the present species frequents meadows and damp pastures." It does not, however, restrict itself to such places. "After having followed the labours of the reaper, and taken their share of the harvest, they attack the newly-sown fields, burrowing beneath the surface, and robbing the husbandman of his next year's crop; and at length retreating to the woods and plantations, commit such devastations on the young trees as would scarcely be credible, were not the evidence too certain to be doubted."*

Our admirable friend, Edward Jesse, Esq., late Surveyor of Her Majesty's Woods and Forests, an able observer of animals and their instincts, and a graphic describer of their habits, has given, in the first series of his "Gleanings," an excellent account of their ravages, from which we will make an extract, referring our readers for further particulars to the valuable and entertaining volume itself:—

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* "British Quadrupeds," p. 326.

"An extraordinary instance of the rapid increase of mice, and of the injury they sometimes do, occurred a few years ago in the new plantations made by order of the Crown in Dean Forest, Gloucestershire, and in the New Forest, Hampshire. Soon after the formation of these plantations, a sudden and rapid increase of mice took place in them, which threatened destruction to the whole of the young plants. Vast numbers of these were killed, the mice having eaten through the roots of five-years' old oaks and chestnuts, generally just below the surface of the ground. Hollies also, which were five and six feet high, were barked round the bottom; and in some instances the mice had crawled up the tree, and were seen feeding on the bark of the upper branches. In the reports made to the government on the subject, it appeared that the roots had been eaten through, wherever they obstructed the runs of the mice, but that the bark of the trees constituted their food. This was ascertained by confining a number of the mice in cages, and supplying them with the fresh roots and bark of trees, when it was found that they fed greedily on the latter and left the roots untouched. Various plans were devised for their destruction; traps were set, poison laid, and cats turned out, but nothing appeared to lessen their number. It was at last suggested, that if holes were dug, into which the mice might be enticed or fall, their destruction might be effected. Holes therefore were made, about twenty yards asunder, in some of the Dean Forest plantations, being about twelve in each acre of ground. These holes were from eighteen to twenty inches in depth, and two feet one way by one and a half the other; and they were much wider at the bottom than the top, being excavated or hollowed under, so that the animal, when once in, could not easily get out again. In these holes at least 30,000 mice were caught in the course of three or four months, that number having been counted out and paid for by the proper officers of the Forest. It was, however, calculated that a much greater number of mice than these were taken out of the holes, after being caught, by stoats, weasels, kites, hawks, and owls, and also by crows, magpies, jays, &c. The cats also, which had been turned out, resorted to these holes, to feed upon the mice; and in one instance, a dog was seen greedily eating them. In another, an owl had so gorged himself, that he was secured by one of the keepers. As the mice increased in number, so did the birds of prey, of which at last there were an incredible number. In addition to the quantity above mentioned, a great many mice were destroyed in traps, by poison, and by animals and birds of prey: so that in Dean Forest alone, the number of those which were killed in various ways could not be calculated at much less than 100,000. In New Forest, from the weekly reports of the Deputy surveyor of the Forest, about the same number were destroyed, allowing the same calculation for those eaten by vermin, &c.: in addition to which, it should be mentioned, that these mice were found to eat each other when their food fell short in winter. Buffon mentions this circumstance, and adds, that they not only devour the smaller of their own species, but also another description of mice which he calls *campagnols*. Putting these circumstances together, the total destruction of mice in the two forests in question would probably amount to more than 200,000. This calculation is made from official weekly returns and other correspondence, and will show the enormous increase of these animals in a few months, as their depredations and destruction were equally sudden."*

The farmers, too, near Liege, according to M. Selys Longchamps, make round holes, about four inches in diameter and a foot deep, and in this way many are caught and destroyed.

The field-vole fights desperately, if confined with his mates and supplied with "short commons." At such times the weaker are eaten by the stronger. It burrows and takes possession of the burrows of the mole and other animals. In winter its sagacity leads it often to take up its quarters in barns or wheat-ricks. Should the season be dry, numbers of field-voles perish. The nest of the female is formed of dried grass, but it is not like the "most artificially platted" beautiful nest of the little harvest-mouse (*Mus messorius*), described by the naturalist of Selborne. This nest is "composed of the blades of wheat, perfectly round, and about the size of a cricket-ball, with the aperture so ingeniously closed, that there was no discovering to what part it belonged. It was so compact and well filled, that it would roll across the table without being discomposed, though it contained eight little mice that were naked and blind.' . . . This wonderful procreant cradle, an elegant instance of the efforts of instinct, was found in a wheat-field suspended in the head of a thistle."* This nest is occasionally brought to London with its inmates, and it is curious to notice the power which the little creature has of winding its tail round a stem or stalk, so as to help it in its progress upwards or downwards,—a faculty not possessed, that we know, by those domestic species of the group which are "pussy's mortal foes." Chapters might be written, and volumes have been written, filled with descriptions of the various and numerous members of the family of mice. Who does not admire the prettily marked Barbary mouse, sometimes kept in cages in this country, notwithstanding its peculiar *murine* smell? The little harvest-mouse is also occasionally petted; and children, in London at least—so various are tastes—are very fond of white mice. It is astonishing how much mischief rats and mice must do in a city of two millions of inhabitants; when in Paris, once on a time, the inhabitants of a district prevented the removal of slaughtering-houses, favourite resorts of rats, lest their own dwellings should be inundated by an invasion about as terrible and distressing as that of any enemy. We, who have no lemmings or hamsters, but only rats and mice, do not sufficiently know our privileges.

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* "Gleanings in Natural History, with Local Recollections, by Edward Jesse, Esq." London, 1832, pp. 175–177. There were two species found, the *Mus sylvaticus* and the *Arvicola*.

A. W.

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* "Natural History of Selborne, by Gilbert White." Letter XII. Nov. 4, 1767, p. 33 (1789).

LIFE, IN ITS HIGHER FORMS.

No. III. (*continued.*)

REPTILES.

THERE may often be seen on sunny banks at this season of the year, basking in the genial beam of noon, a little Reptile, well known under the appellations of Blind-worm and Slow-worm. As it lies motionless, you might almost fancy it a foot's length of thick iron wire, slightly polished, for it is almost equal in thickness in every part, and its surface gleams with a metallic lustre in the bright sun. Here is the village apothecary coming up the lane, poring over a book with spectacles on nose; let us ask him if he can tell us anything about it. "O yes! it is the *Anguis fragilis* of Linnæus!" and he passes on. Oh! the Brittle Snake! for such is the English of those two Latin words.

But here is Hodge the hedger: perhaps from his occupation he may have some acquaintance with the bit of dingy wire: what say you, Hodge? "'Tis a Zneak, dang 'un!" and he makes a spiteful blow with his stick across the back of the poor animal, with the apologetic asseveration, "'Tis a deadly pizon varmin!" But see, the blow has effectually demolished it, and that in a strange manner; for, as if it had been made of glass, it has snapped across in four or five places; and we at once perceive the propriety of one of its Latin appellations, that of "*fragilis.*"

Science and ignorance agree, then, that the Slow-worm is a Snake; but science and ignorance are both mistaken, for the creature is a *Lizard.* The assertion seems paradoxical, when we think of the two pairs of well-developed limbs, each armed with five jointed and clawed toes, that the Lizard possesses, and of the way in which it uses them to scamper away from our intrusion beneath the heath and furze; but it is true that the slender, limbless, snake-like Slow-worm is, in all the most important points of its anatomy, a Saurian, and not a Serpent. Undoubtedly it is one of the links by which these two very diverse forms are bound together, and, like all such links, forms a most interesting subject of study. The degeneration and gradual disappearance of the limbs, in the progress of the various genera that, like so many stepping-stones, bridge over the wide passage from the Lizard to the Serpent, are phenomena peculiarly worthy of observation; and we cannot do better, in bringing them before our readers, than to quote the words of the eloquent historian of "British Reptiles," in his account of this very Slow-worm :—

"From the well-known family of the *Scinks*, or *Scincidæ*, with their true legs and five-toed feet, down to the present species and its immediate congeners, every possible gradation is to be found in the development of the interior and posterior extremities. Agreeing, as they all do, in the Saurian character of the structure of the head, the consolidation of the bones of the cranium and jaws, and the narrow and confined gape, so different from these parts in the true Serpents, they yet approach the latter in the comparative length of the bodies, and in the gradual diminution and ultimate disappearance of the extremities. In the genus *Scincus*, for instance, the limbs are already less robust than those of the true Saurians; the two pairs are also more distant from each other, in consequence of the greater comparative elongation of the body. There are as yet five perfect toes on each foot, which, however, are shorter and more even in their relative proportions than in the true Saurians. These deviations become increased in the genus *Chalcides*, and still more in *Seps*, which has a very elongated body, the limbs extremely small, and the toes only four or three on each foot. In *Monodactylus* a further reduction takes place in the development of the limbs, which have dwindled to a mere little undivided finger; they are still, however, four in number; but in the genus *Bipes* the anterior ones have wholly disappeared, and are found in a rudimentary state under the integument, the posterior ones constituting only small undivided processes. These also being removed, the Ophidian form of the present genus, and those of *Tortix*, *Typhlops*, and others, with all the *Amphisbænidæ*, succeed, in which the bones of the shoulder, the sternum, and the pelvis, exist in a more or less rudimentary condition, and lead us towards the true Snakes, in which all these parts are lost, excepting the rudiment of a posterior extremity, which in the *Boa* appears externally in the form of a small horny hook, or holder, on each side of the vent."*

Besides the Slow-worm, we have in the British Isles but two representatives of the vast Lizard group,—the Order *Sauria*. One of these is the elegant Sand Lizard of our sandy heaths (*Lacerta agilis*), which is beautifully marked along the sides with eye-like spots, and sometimes occurs of a rich variegated green hue. The other is the smaller, but more common Viviparous Lizard (*Zootoca vivipara*), whose interesting peculiarity is expressed in its name, that of producing a living progeny, most Reptiles laying eggs. The difference between these two conditions is, however, less important than it at first appears; for there is every reason to believe, that in this case, as well as in that of the Viper (*Pelius berus*), which is also viviparous, the egg-covering, which is merely a parchment-like membrane, and very thin, is ruptured in the act of parturition.

The most remarkable genus in this Order, and indeed in many respects the most extraordinary and anomalous of all Vertebrate animals, are the Chameleons, of fabulous and poetic celebrity. They are Lizards inhabiting trees in the warmer countries of the Old World, with a great development of head, and a shagreened skin. As the Monkeys of South America are fitted for their arboreal habits by grasping hands and a prehensile tail, so is the Chameleon, by a curious modification of the common Lizard organization. The toes are five, as in the majority of Saurians, but these are arranged in two sets, three in one set and two in the other, each set being enveloped in the common skin as far as the claws. These two parcels of toes are opposed to each other, and thus each foot forms a true grasping hand, and is used in the manner which this structure indicates ; the Chameleon moving with slow and deliberate steps, always grasping with a firm hold the branch on which it is creeping, before the other feet are relaxed for a fresh step. The tail is round and prehensile at the tip, like that of the American Monkeys ; its under surface is roughened with small granulated *papillæ*, as is that of the toes also, probably in order to the more delicate perception of the surface grasped. The tongue affords an analogy to the same organ in the Woodpeckers, no less singular than that of the feet ; for though ordinarily concealed within the mouth, it is capable of being darted forward at its insect prey, and, being furnished with a glutinous secretion, secures it by its adhesiveness.

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* "British Reptiles," p. 40.

A most extraordinary aspect is communicated to these Reptiles by the structure and movements of their eyes. In the first place, the head is enormous, and being three-sided with projecting points and angles, makes a sufficiently uncouth visage ; but the eyes which illuminate this notable head-piece must, indeed, to borrow for the nonce the phraseology of Barnum, "be seen to be appreciated."

There is on each side an immense eye-ball, full and prominent, but covered with the common shagreened skin of the head, except at the very centre, where there is a minute aperture, corresponding to the pupil. These great punctured eye-balls roll about hither and thither, but with no symmetry. You cannot tell whether the creature is looking at you or not; he seems to be taking what may be called *a general view* of things;—looking at nothing in particular, or rather, to save time, looking at several things at once. Perhaps both eyes are gazing upwards at your face; a leaf quivers behind his head, and in a moment *one eye* turns round toward the object, while the other retains its upward gaze; presently a fly appears, one eye rapidly and interestedly follows all its movements, while the other leisurely glances hither and thither, or remains steady. Accustomed as we are to see in almost all animals the two eyes move in unison, this want of sympathy produces an effect most singular and even ludicrous.

The Lizards are not in all cases the little leaping, timid, playful creatures that we commonly associate with the name. The aquatic Monitors (*Varanidæ*), of both continents are truly formidable. M. Leschenault de Latour saw one attack a young stag as it attempted to swim across a river, striving hard to drown it. The deer was too active on this occasion, but the same zoologist found the thigh-bone of a sheep in the stomach of one that he dissected. The tail in this group is very muscular, and is compressed throughout its length; it thus forms a powerful swimming organ, especially as its upper edge is frequently surmounted with a crest of flattened elevated scales. These large and powerful Lizards, which are often five feet in length, and stout in proportion, usually endeavour to overcome their prey by dragging it into a river and drowning it.

In all these particulars we see an approach to those mighty tyrants of tropical rivers, the Crocodiles, which have been celebrated from remotest antiquity as the very impersonation of bestial power and ferocity. The noble description of Leviathan in the book of Job,—the climax of those majestic interrogatories wherewith Jehovah withered the pride of his too audacious servant,—is a picture of one of these Reptiles, drawn from the life by the master-hand of Him who made it.

"Who can open the doors of his face? his teeth are terrible round about. His scales are his pride, shut up together as with a close seal. One is so near to another, that no air can come between them. They are joined one to another, they stick together, that they cannot be sundered. By his neesings a light doth shine, and his eyes are like the eyelids of the morning. Out of his mouth go burning lamps, and sparks of fire leap out. Out of his nostrils goeth smoke, as out of a seething-pot or caldron. His breath kindleth coals, and a flame goeth out of his mouth. In his neck remaineth strength, and sorrow is turned into joy before him.

"The flakes of his flesh are joined together: they are firm in themselves: they cannot be moved. His heart is as firm as a stone; yea, as hard as a piece of the nether millstone. When he raiseth up himself, the mighty are afraid: by reason of breakings they purify themselves. The sword of him that layeth at him cannot hold; the spear, the dart, nor the habergeon. He esteemeth iron as straw, and brass as rotten wood. The arrow cannot make him flee: slingstones are turned with him into stubble. Darts are counted as stubble: he laugheth at the shaking of a spear. Sharp stones are under him: he spreadeth sharp-pointed things upon the mire.

"He maketh the deep to boil like a pot; he maketh the sea like a pot of ointment. He maketh a path to shine after him; one would think the deep to be hoary. Upon earth there is not his like, who is made without fear. He beholdeth all high things: he is a king over all the children of pride."—JOB xli. 14–34.

The most prominent characteristics of the Crocodile of the African rivers are here distinctly painted. The impenetrable nature of the integument, a sort of surface-bone; its arrangement in strong square scales, set firmly edge to edge, one against another in close array; the peculiar fiery glare of the eyes; and above all, the serried teeth, which, to the number of thirty or more on each side of each jaw, are never concealed by lips, giving to the animal, even when tranquil, the terrific appearance of a grinning rage,—are all points that scientific naturalists have dwelt on in their descriptions of these monsters. When we remember that they are among the most gigantic of all animals, far exceeding the Elephant, the Crocodile of the Nile being asserted to attain a length of twenty-five feet—we shall acquiesce in the propriety of the concluding epithet,—"King over all the children of pride."

If space in "Excelsior's" valuable pages permitted, we should delight to trace the transition, through the fierce *Chelydra* of Florida, from the Crocodiles to the Tortoises. But we must be content with directing our readers' attention to the contrast which subsists between one of these latter, enclosed as it is in an immoveable box of bone, with only an opening in front at which to poke out its head and hands, and a similar hole behind for its tail and hind limbs, waddling along with painfully slow and heavy tread;—the contrast, we say, between such a creature and the lithe Snake, the very type of flexibility, altogether destitute of limbs, yet shooting along with an undulating velocity that the eye of the gazer can scarcely follow.

P. H. G.

PIONEERS AND FIRST-FRUITS.

MORRISON IN CHINA.

CHINA contains a third of the human species. Nothing can be sooner said; few things are harder to realise. But some standards of comparison may help us. Taking our own country as the measure, the population of China would fill England and Wales twenty times over, and Scotland 120 times. If a book is published in the English language, including the inhabitants of the old world and the new, there are probably fifty millions of persons who, if they possessed the art of reading, would be able to peruse it; but when a book is published in Chinese, it commands a range of readers seven times greater: that is to say, for one person who can read the "Paradise Lost" and "Bacon's Essays," there are seven who can read Mencius and Confucius in their native tongue. If the population of London be two millions and a half, and if an attempt were made to supply every citizen with a copy of the Scriptures, could the distributor prevail on the whole to pass in single file before him, by working ten hours a-day for six days in the week, and giving away at the rate of 1000 Bibles per hour, in the course of less than ten months every Londoner would be supplied with the Word of God; but at the same rate it would require 120 years to supply every Chinaman: were the distribution now begun it would not on that plan be ended before A.D. 1976. There is another and a very solemn way of putting it: out of every three deaths which occur, one occurs in China. Of the three accountable and immortal beings who last passed into the presence of their

Maker, it may be assumed that one came from the Chinese Empire.

Not only are the Chinese exceedingly numerous, but physically and mentally they are a superior race. Tartar domination, with its Gorgon eye, has petrified their civilisation into something very stiff and stupid-looking; and with its cold metaphysical selfishness, and its absence of a God holy, benign, and ever ready to hear and answer prayer, the religion of China has made its people cunning, rapacious, deceitful, sensual, and heartless. But they have great capabilities. With their muscular frames and great tolerance of fatigue, they are industrious, and, when opportunity is given, they are very enterprising. And although we laugh at their noisy arrogance and great swelling words, we must concede their intelligence. Inventing for themselves paper, gunpowder, book-printing, the compass, spectacles for aiding feeble vision, and many of those appliances which have immortalised the sages of Europe, their civilisation is of much earlier date than ours. At a period when the nations of Europe felt interest in little except mutual slaughter; when every castle on the Rhine was a robber's den, and the very barons of England were little better than high-born ruffians; the Chinese were pursuing the arts of a peaceful culture; were intersecting their "flowery land" with canals and elaborate highroads; were building porcelain pagodas; were suspending in the air gardens full of delicious fruits and rare exotics; were manufacturing the most exquisite fabrics of silk and cotton, as well as objects ingenious or beautiful in ivory, silver, and stone. It is only within the last generation that the descent of solid bodies, or meteorites, from the firmament, has become a recognised fact among the learned; but it is a remarkable circumstance, and shows the early intelligence and observant habits of this singular people, that for centuries a careful registration of every aerolite has been kept throughout the empire by command of the Chinese Government.

Populous and interesting as this empire is, it was almost unknown to Britain at the commencement of the present century. A few had read the travels of Marco Polo, and Macartney's Embassy had attracted some attention, and for commercial purposes ships and merchants traded to Canton and Macao; but in as far as they influenced the thoughts and actions of most British Christians, that portion of Adam's family might as well have had their dwelling in the moon. Sir George Staunton was the only Englishman acquainted with the language, and there was a prevailing impression that the speech as well as the territory of this mysterious people effectually debarred the stranger's entrance. It was not till the year 1807 that the first Protestant missionary found his way to China.

Robert Morrison was born at Morpeth, January 5, 1782; but his parents left it soon afterwards, and Newcastle was the home of his youth. His father, who was a Scotchman by birth, and a last-maker by trade, was a God-fearing man, and an elder in the High Bridge Meeting. He brought up his family very strictly, taking pains to teach them the Shorter Catechism, and encouraging them to commit the Scriptures to memory. In his boyhood Robert could repeat such difficult portions as the 119th Psalm without a single mistake. But it was not till his seventeenth year that he felt the grace of God in truth. At that period his conscience effectually awoke. He felt his guilty state before God,—was haunted with the dread of everlasting damnation,—broke off from his loose companions,—and from the usual levity of youth showed a change to the solidity and sobriety of one who lived under the powers of the world to come. Along with this change sprang up an earnest desire for self-improvement. In order to secure time and quiet he had his bed removed to the workshop, and although he had to labour from twelve to fourteen hours a-day, he contrived to teach himself various branches of useful knowledge. And in days long subsequent he used to revert, as one of the most hallowed periods in his history, to the Saturday nights when the week's work was ended, and the carpenter's shop was swept out and prepared for the little prayer-meeting which used to assemble in it: the same humble Bethel serving as a study and an oratory, when the Sabbath hours were passed in reading Hervey's "Meditations," Henry's "Commentary," and the "Missionary Magazine." The upshot was that a desire to enter the Christian ministry began to dawn in his mind. He was received as a pupil at Hoxton Academy, and after continuing there a year his thoughts so turned to missions among the heathen, that he was transferred as a student at the Missionary College under Dr. Bogue of Gosport.

Having devoted himself to the service of the Lord Jesus, it was the prayer of the young student that He would station him in that part of the missionary field where the difficulties were greatest, and to human appearance the most insurmountable. It was not long before that prayer was answered. Chiefly through the representations of the Rev. W. Moseley, the attention of the Directors of the London Missionary Society had been turned to China. They resolved to make an effort. They asked young Morrison to go. He hailed the invitation with joy. At first he tried to induce some of his young brethren to accompany him, but, failing in securing an associate, he prepared to go alone. And at once, with the same vigour of spirit and strength of will with which he had mastered Latin in the carpenter's shop by redeeming the hours from slumber, he set about obtaining the necessary qualifications. The fifteen months which intervened he spent in London studying medicine, astronomy, and departments of science likely to be useful hereafter; and with admirable industry he copied in the uncouth Chinese character a MS. of the Acts and Pauline Epistles which he found in the British Museum, and a Latin and Chinese Dictionary which was lent him by the Royal Society. Having obtained an introduction to Dr. Hutton, the Astronomer Royal, he used to walk down from his lodgings in Bishopsgate Street to the Observatory at Greenwich, carrying with him all the instruments required for making observations, and reading the whole of the way. It is also well to record, as showing that the prospect of a remote and boundless sphere elsewhere did not make him blind to opportunities at his own door, that it was through his instruction that the servant in the house where he lodged was brought to a saving knowledge of the Gospel, and soon afterwards died rejoicing in hope of eternal life.

In January 1807, Mr. Morrison was ordained in the Scotch Church, Swallow Street, and immediately set sail for New York. The East India Company at that period would not allow any missionary to set foot in their territories, and it was believed that they would throw obstacles in the way of a British subject proceeding on an evangelistic errand to China. He therefore deemed it expedient to place himself under the protection of the American flag, and for this purpose in the first instance sought the United States. At that period a departure like his was regarded as an exile for life, and in the journal which records his leaving the Isle of Wight he says:—

> "It was in much probability the closing prospect of a land that I shall visit no more. O! may the blessing of Heaven rest upon it. 'England, with all thy faults, I love thee still.' I love the land which gave me birth, that to this hour has nourished me—the land of my fathers' sepulchres—a land that God has delighted to honour; and, a circumstance

which renders it superlatively dear, there his saints in numbers dwell. May the candlestick—the glorious Gospel—never be removed from thee. Should I be ashamed to acknowledge that the silent tear, unseen, stole down my cheek, as the summit of the distant hill, mingling with the clouds, receded from my view? and, the eye unable to distinguish it, that the endearments of maternal care—my father's house—beloved friends and Christian society—objects and delights to be seen and enjoyed no more, rushed in upon my mind, and cast a momentary damp over my spirits?"

So it is. The Gospel softens the heart and intensifies the natural affections; and it is only men of warm hearts and strong feelings who, humanly speaking, are fit to be evangelists,—fit, that is, to exert a softening, melting influence on the minds of others. To such men, however, the trial of forsaking house and parents, and brothers and sisters, for Christ's sake, is peculiarly severe: but it is undergone every time that a Protestant missionary goes far hence to the heathen; and it is compensated every time that he can add, as Morrison added, "But there is a better country than that from which I have gone out. I believe its existence, and I hope I have there an inheritance. I go not to the East to make my fortune; my fortune is made. I trust that the Lord God Almighty has constituted me a joint-heir with Jesus Christ, and that in a few years he will put me in possession of the rich estate."

And so he proceeded on his way,—a man whom the Spirit of God had moulded for his work; a grave, earnest man, with strong feelings, but too proud to show them; with a mind naturally firm and self-reliant, and more apt to take counsel with himself and with God than with his fellow-men; not affable, but civil; capable of vast and continuous application, with an excellent bodily constitution, a good memory, a high purpose, and great faith in God. And so, Mr. Morrison," said a sarcastic merchant in New

York, "you expect to convert the Chinese empire?" "No, sir," said Morrison; "I expect GOD will."

The first night of his stay in New York he was placed in the apartment usually occupied by his host and hostess, where in a crib their little child had already gone to sleep. Awaking in the morning, she turned as usual to talk to her mother; but seeing a stranger where she expected to find her parents she roused herself with a look of alarm, and fixing her eyes steadily on his face she inquired, "Man, do you pray to God?" "Oh, yes, my dear!" was the reply, "every day: God is my best friend." She then laid her head on the pillow, and fell asleep.

In the autumn he reached Canton, and as far as he knew he was the only Christian there. His prospects were by no means cheering. Betwixt the jealousy of the Portuguese priests at Macao, the dislike and contempt of the European traders, and the probable enmity of the Chinese, his position was very precarious. It was even difficult to find any native willing to teach him the language; for, curiously enough, in their proud monopoly of all good things, "the inner people" deemed it a crime to teach a stranger the Chinese tongue, or to sell to him Chinese books. But by prudence, and taking advantage of Chinese cupidity, the new-comer soon overcame every obstacle; and at the end of two years, such was his proficiency in Chinese literature, that he was appointed translator to the East India Company,—an appointment which, if it taxed his time, at least materially fortified his position, and increased his opportunity of serving that people whose welfare had brought him from the ends of the earth.

The spiritual dreariness of his position is forcibly described in a letter to England five years after his arrival:—

"Yours is a happy land. It abounds with all the means of instruction, edification, and comfort, which a Christian can desire. Far different are our circumstances. You do well to write much and often. This day you look around you, and can rejoice in thousands on thousands assembled to praise God, and hear of His great salvation; but here are millions wandering as sheep without a shepherd. None cares for the soul of his brother, and few for their own, and those few wander in the gloom of ignorance. Fears and hopes they have respecting an hereafter: their fears visionary; the foundation of their hope the observance of some rite, or the repetition of some prayer thousands or millions of times. They are wedded to their idols. A stock, or a stone, a clay image, a picture, they consecrate as the representation of Deity, and fall down and worship it. The poor, the sick, the distressed, the dying, the unfortunate, the prosperous,—all have respect to the idols of their own forming. How desirable, yet how ill-received a duty, to point out to them 'a more excellent way!' Your now highly-illumined country was once equally dark. The light of 'the glorious Gospel of the blessed God' has cleared away the darkness, and shed around you a flood of day. Though many amongst you shut their eyes against the light, thousands rejoice in it."

Warfare is not so simple an affair as civilians are apt to imagine. It is not enough to land an army on a hostile shore, but it must be accompanied by ship-loads of tents, and guns, and stores; and it is not enough for the attacking force to run up to the fortification in order to seize it at once, but they must sit down at some distance, and entrench themselves, and throw up breastworks, and open lines, and zigzags, and parallels, and get their guns into position. And somewhat similar is the mode of procedure in a great missionary enterprise—in a grand evangelistic invasion, such as that of which Morrison was the pioneer. It was not enough for him to land on the wharf at Canton or Macao, and at once open his lips to a crowd of willing or wondering natives. In the eyes of these natives he was odious as a foreigner, and contemptible as a barbarian. Before he could approach them with any advantage it was needful to get the key of the position,—it was needful to propitiate individuals, at least; and it was needful to make himself master of Chinese opinions, prejudices, and modes of thought. Above all, it was needful to command their awful and sphynx-like language, and acquire an idiomatic fluency in a tongue which scarcely one of all his countrymen had ever wielded. But Morrison was not content to be wise for himself. In conquering the language for his own use, he determined to leave the gate open for his followers. Accordingly, with incredible drudgery, besides publishing a Chinese grammar, he toiled on year after year at the most arduous work in which a scholar can engage—the preparation of a lexicon; and at last, in six great quartos, and at an expense of 15,000*l.*, the East India Company published that great monument of missionary scholarship and chief magazine of Chinese learning,—Morrison's Chinese Dictionary. It was completed in 1821.

Simultaneously with this gigantic work, he was engaged in a more congenial task,—the translation of the Scriptures. In this he had for his coadjutor the Rev. W. Milne, by whom he was joined in 1813; but 39 of the 66 books of the Bible were entirely Dr. Morrison's own translation.

Next to his piety and his devotion to China, the most admirable characteristics of Dr. Morrison were, his strong sense and his industry. The former preserved him from everything like exclusiveness and fanaticism. "Our venerable friend," he writes, "seems to underrate books as a means of converting the heathen nations. I see no occasion for this jealousy: our Saviour uses, I think, various means. Missionaries, and books, and colleges also are useful; though none of the means of salvation are without their defects. Books lie unheeded; missionaries become careless or immoral; colleges degenerate: where is there perfection on earth?" Such was his industry that, when engaged on the Dictionary, he tells his family that they need not send the newspapers, as he has not time to read them.

At last, in 1824, and after an absence of seventeen years, he paid a visit to his native land. Full of enthusiasm for his adopted country, he brought with him a Chinese library of 10,000 volumes, and fondly hoped that some university might be induced to found a chair of Chinese literature. And assuredly he himself was received with the warmth of which he was worthy. Noticed by the King, visited by learned men, and met with tears of affectionate admiration in Christian assemblies, the day when he made his appearance on the platform of the Bible Society, with the Chinese Scriptures in his hand, will long be remembered as a memorable incident in the history of modern evangelisation.

After two years' absence, Dr. Morrison returned to China; where at last, after the toils of a quarter of a century, he rested from his labours, August 1, 1834.

Half-a-century has not elapsed since Morrison set foot on Chinese soil, and, unfurling the banner of the Cross, took possession in the name of Prince Immanuel. For many years he was a solitary labourer: now there are nearly a hundred European and American agents at work. When he arrived, there did not exist so much as a tract fit for distribution among the natives: now there are not only numerous tracts and religious books, but admirable versions of the Scriptures carefully revised, and funds subscribed sufficient to send into circulation a million copies. For seven years he prayed, and conversed, and exhorted, without knowing of a single convert; now no year passes without accessions to the Church, and many of these converts so able and so earnest, that at least fifty of them are engaged in the work of evangelising their countrymen. All throughout his life so jealously was China guarded, so sacred was its soil, so supercilious were its citizens, that there was only one spot where a European dared to land; and whilst a special ambassador from Britain was driven from the capital ignominiously, and without so much as an audience, no Chinaman cared to quit his own self-contained and self-sufficing country. But since Dr. Morrison entered into rest five at least of the imperial ports are a safe residence to any Englishman, and even one small fragment of the soil is British territory; whilst—to say nothing of individuals who in Europe or America have mastered our Western learning—in the West Indies, California, and the Australian gold-fields, tens of thousands of Chinese adventurers are acquiring wealth and are learning new ideas. And although it would be extravagant to ascribe all these changes to Dr. Morrison or any man, it is well to note the contrast for the encouragement of those who lead a forlorn hope in the Christian army, and in order to fill our own minds with a sense of responsibility. Now that China is open, it can hardly be said that any door is shut; and now that the door of China is open, it would be very mournful if the Church of Christ did not enter in, or if, through lack of prayer or promptitude, we allowed it to be closed again.

Before Dr. Morrison left China for England, he ordained as a native evangelist a convert of Dr. Milne, named Leang-Afă. This good man laboured among his countrymen with much diligence for thirty years, and was the means of bringing to the faith not a few. In 1834, at an examination of literary aspirants in Canton, Leang-Afă distributed a tract containing an outline of the Christian religion. A copy fell into the hands of a student on whom it made a great impression, and who fourteen years afterwards came to Mr. Roberts, a missionary at Canton, seeking further instruction. Mr. Roberts regarded him as rather visionary in his religious views, and erelong the inquirer disappeared. It turned out that he had gone to the Kwang-si province, and there proclaimed his views of Christianity. Many of the people joined him in his denunciation of idolatry, and some of them being seized and imprisoned their neighbours took arms. Under the leadership of the catechumen, who is known as Hung-tse-suen, the insurgents soon mustered so strong, that army after army which was sent to crush them was defeated and dispersed, till, with its twofold declaration against idolatry and against the Tartar dynasty, the insurgent force grew strong enough to carry all before it, and take the city of Nanking. Whatever errors and illusions may be mixed up with the movement, there can be no doubt that it includes within itself a moral reformation as well as a patriotic revolution. The one living and true God is their only object of worship, and their progress into new regions may be known by the fragments of huge wooden idols and the detritus of pagodas floating down the rivers. In their camp daily worship is observed, and the Sabbath is kept with great sacredness. They are fond of singing hymns, some of which conclude with the doxology to the Father, Son, and Spirit. The Ten Commandments are their code of morals; and so strict is their temperance, that opium and tobacco are absolutely prohibited within the patriot camp. Whether the revolution shall eventually succeed, or whether in its present form it is destined to roll back and subside, there can be no controversy as to the wholesome shake which it has given to the long-stagnant mind of that mighty population; and even as it is, Leang-Afă's tract and the Chinese insurrection are one of the most remarkable examples of a great tree springing from a little mustard-seed. H.

LUCIFER-MATCHES.

INSIGNIFICANT as the object of our history may appear, we believe our readers will find, that neither the Locomotive nor Ocean Steamer, the Electric Telegraph nor Photography, presents a more interesting chapter in the progress of civilisation than the Lucifer Match, which meets us at every turn in social and domestic life, playing its important part alike in the palace and the cottage.

From the rude plan, in use among the most ancient nations or savage tribes, of producing *fire* by rubbing dry sticks together, down to our prompt and responsive lucifer, we will find a gradual development of the attempt to procure *instantaneous light*, while each step will show how slow and laborious has been the progress.

We cannot resist the temptation to allow St. Pierre to describe the ancient plan as once practised in the West Indies.

The Dry Stick.—" With the sharp edge of a stone, Paul made a small hole in the branch of a tree, that was sufficiently dry, which he fixed firmly between his feet, and he then employed the stone to shape into a point another piece of wood equally dry, but of a kind differing from the former. He next placed the pointed wood in the hole which he had provided, and made it to turn rapidly between his hands like a chocolate-mill, and in a few minutes he had smoke and spark issuing from the place of contact; then collecting dry plants and sticks, he lighted a fire at the foot of the palm-tree."

Even the Romans employed no better method, as we learn from Pliny; though the use of the flint and steel must have been known in some form from the expression which Virgil uses when speaking of the "fire hidden in the veins of flint,"—

> "Semina flammæ
> Abstrusa in venis silicis."

The earliest improvement on this rude plan was the

Flint and Steel,—Which remained for many centuries the only method in common use; and the Saxon ***Fyr-stan*** and steel with tinder-box have descended even to our own day, which will remind some among us of loss of temper on sundry dark mornings in days long gone by. It is worth notice that the principal device in the collar of the Order of the Golden Fleece, founded in 1429, was this flint and steel.

In some districts the preparation of tinder was and remains a regular industrial occupation, for which certain fungi are used. All the hard portions are removed, and after exposure to the action of a potash ley for some weeks, the mass is beaten with wooden hammers, and finally rubbed between the hands until it becomes soft and pliant. It is then stained by the action of nut-galls, and a salt of iron, or bleached by means of chloride of lime. Paper, linen, and woollen materials, are also employed, and in latter years a portion of nitre was added to increase the inflammability.

The piece of iron or steel was made of various shapes, one of the earliest forms being the *Fusil*, a thick rhomboidal mass of steel, the faces of which were cut into many angles, while the ends were curved back so as to form a handle.

When the metal was brought rapidly in contact with the fyr-stan, or flint, small splinters were broken off in a red-hot state, which falling among, ignited the tinder, which was afterwards fanned into a flame in the so-called little iron box or *tinder-box*.

The Sulphur Match.—The property which sulphur possesses of taking fire at a temperature of 300° Fahr. explains its ancient use in making those matches which proved so great an improvement in connexion with the preceding, and which are still associated in our minds with many a poor old distributor. This time-honoured old match still performs an important function in the modern lucifer, and links the present to the past, through various attempts to replace it, among which we notice next the.

Pyrophorus.—This substance was first made by Homberg, which may be prepared by mixing 3 parts of alum with 2 or 3 parts of honey, flour, or sugar, and cautiously drying it, with constant agitation, in an iron pan. The mixture at first melts, and dries into small pieces, which are reduced to powder, and again roasted. A portion of this powder sprinkled upon dry cotton causes it to take fire.

Dr. Hare has suggested a mixture of 3 parts lamp-black, 4 parts calcined alum, and 8 parts carbonate of potash; and Gay-Lussac, a simple mixture of 5 parts dry lamp-black, with 9 parts of sulphate of potash. Gobel has made an excellent pyrophorus by heating tartrate of lead red-hot in a glass tube, which must be afterwards hermetically sealed.

Gay-Lussac refers the action of these combustibles to the presence of finely divided sulphurets, while other chemists attribute the incandescence of the carbon to the oxidation of potassium.

We then had

The Pneumatic Tinder-box or Light-Syringe.—An ingenious application of the heat evolved by the compression of air, was made by a person called Mollet, which, although a great advance on the pyrophorus, requires too much dexterity in its use for ordinary purposes, and, as Joule and Thompson would say, the heat evolved would at best be only an exact equivalent of the mechanical power exerted.

The machine consisted of a small metallic cylinder with an accurately fitting piston. The under part of the cylinder was attached by a screw, and a small quantity of tinder or amadou was contained in a recess. By a rapid stroke of the piston driving it home, the air was suddenly compressed, which diminished its capacity for heat, when the excess ignited the amadou in the recess, which was then removed for use by various contrivances.

The first "Instantaneous Light Machine" was called the

Inflammable Air-lamp of Volta,—Which consisted of a glass reservoir filled with hydrogen gas, that could be subjected to the pressure of a column of water by turning a stop-cock. The pedestal upon which the reservoir was placed was an electrophorus ; and the apparatus was so adjusted by connecting wires, that on turning the cock a small stream of hydrogen rushed out, and met an electric spark from the electrophorus, which ignited the gas. The objection to this apparatus arose from the danger of air mixing with the hydrogen, and thus leading to explosion.

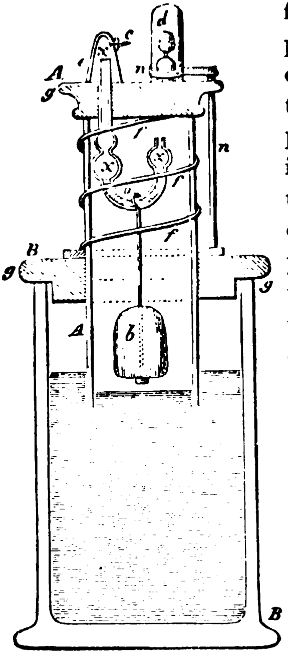
A more elegant contrivance succeeded, called

The Platina Lamp.—The discovery by Dobereiner of the property which finely-divided or *spongy* platinum possesses of inflaming a mixture of hydrogen gas and atmospheric air, led to the invention of what he called the *Hydrogen Lamp ;* and there is no doubt that it promoted the application of various discoveries, which had been accumulating in the laboratory of the chemist for the production of light.

Partly on this account, and partly because it is so beautiful an illustration of an ingenious application of then existing facts to a social want, we will describe this lamp at some length.

Spongy platinum is prepared by dissolving this metal in aqua regia, and adding muriate of ammonia, when the metal is precipitated in combination with chlorine and ammonia. This substance is made into a paste, and placed in a loop of thin platina wire. When this pasty mass is exposed to a strong heat, it is decomposed, and nothing but the metal is left in the form of a porous body or sponge. Metals generally, when in this state of fine division, possess the power of inducing the combination of gases at a temperature much below that necessary under other circumstances. Faraday has found that a perfectly smooth, bright, and thin sheet of platinum, in a mixture of pure oxygen and hydrogen, in the proportion to form water, gradually acquires a high temperature, until it becomes red-hot, when the gases combine. The same action takes place with the spongy platinum, which is rendered incandescent; and the red-hot metal at last ignites the jet of hydrogen gas, as it issues from the apparatus. The spongy platinum presents a surface at least 100 times larger than the same bulk of metal in a solid form. It is supposed this peculiar property depends upon the condensation of the gases to such an extent, that not only is their natural repulsion overcome, but their molecules are brought within the range of their chemical affinity, which appears only to act at insensible distances.

The apparatus is shown in the woodcut; and the reader will find the spongy platinum covered by a brass cup *d*, which is attached to the wire *n* exactly opposite the small opening *c*, whence a stream of hydrogen gas issues when the lamp is in operation. The gas is produced in the vessel B B, by the weak sulphuric acid, represented by the shading, acting upon a piece of zinc *b*. The upper vessel A A slides in the lid *g* like the piston of a pump, and is maintained in its position by the spring *f f f*, the gas escaping through the glass tube *x x x*, which is closed by a few drops of sulphuric acid *o*. When this upper vessel is



forced down by the hand, the pressure on the accumulated store of gas drives the liquid *o* into the bulbs, and allows the gas to pass into the fixed cap *o*, whence it plays in the form of a jet on the spongy platinum. The escape of the gas is, however, accompanied with a rise of the acid, which, coming in contact with the zinc, generates a fresh supply of gas, and thus the process is continued without interruption, until the materials are converted into sulphate of zinc.

This arrangement was first proposed by Eisenlohr, but many modifications were introduced in different countries. In these islands it did not prove so useful as on the Continent, where the atmosphere is not so moist, and where the spongy platinum does not so soon lose its power by the pores becoming filled, as it were, with water.

Another scientific means of lighting a match was by means of voltaic electricity. The usual arrangement of a small plate of zinc with a double plate of copper, when dipped in dilute acid, produced a current of sufficient power to heat red-hot a fine platinum wire connecting the dissimilar plates. On applying a piece of touch-paper, it was immediately ignited, with which a match was kindled. The match containing sulphur could not be brought in direct contact with the red-hot metal.

We now arrive at the first stage of modern inventions which led immediately to the Lucifer, and we commence with what was called

The Chemical Match.—The old sulphur match was covered with chlorate of potash, and the paste used for these matches is said to have been composed of

Sulphur	25	parts.
Chlorate of potash	30	„
Colophony	2	„
Vermilion	1½	„
Gum in solution	2	„

The chlorate of potash ($K, Cl_2 O_5$), when brought in contact with strong sulphuric acid in the cold, is decomposed with an explosion and the production of fire. The products of this decomposition, in the first instance, are bisulphate of potash, perchlorate of potash and chlorous acid; but these two latter substances undergo a further change, the former becoming chloride of potassium and oxygen, while the latter is resolved into chlorine and oxygen. The products of the secondary decomposition ignite inflammable matters of all kinds, such as sulphur, resin, gum, sugar, &c., when within immediate reach of their action.

The chemical match dipped in sulphuric acid at once took fire. The acid was usually kept in a bottle filled with asbestus, and fitted with a glass stopper or a plug of india-rubber, which were used for touching the match.

Camphor and frankincense were sometimes mixed with the paste, and the wood used was cedar, so that a pleasant odour was diffused in obtaining a light.

These matches were probably invented in France, and thence introduced into this country; but previous to this date, Captain Manby had been accustomed to use a similar mixture for firing a small piece of ordnance for conveying a rope to a stranded vessel. Parke also described a similar compound in his "Chemical Catechism," as early as 1808. Mr. Jones employed the same principles in the preparation of his

Prometheans.—He took equal quantities of sugar and chlorate of potash, which he made up into a thick paste with a solution of gum, and coloured the whole with vermilion. The sulphuric acid was contained in thin glass beads. A bead surrounded with a little of the paste was rolled up in gummed paper and then dried. The glass bead was crushed between a pair of pliers, sold with the matches, when the acid, coming in contact with the dry paste, caused the whole to ignite.

The writer may be allowed to mention that he lately had an opportunity to examine one of the Russian explosive machines, fished up in the Baltic during the summer of 1855, and found it to depend for its action upon the above ingredients. A moderate-sized tube, partially filled with cotton wool, dusted with sulphur and chlorate of potash, contained a glass bulb full of sulphuric acid. The slightest shock sufficed to break this bulb, and the fire which followed would ignite the gunpowder in the larger vessel.

A somewhat similar invention called the *Empyrion*, was superseded by the

Friction Match,—Which appeared in 1832. They were coated with a mixture of 2 parts sulphuret of antimony and 1 part chlorate of potash, made into a paste with gum-water, which was applied to the end of an ordinary sulphur splint or match. They were ignited by drawing them rapidly between the surfaces of a piece of folded sand-paper, which was compressed at the same moment by the finger and thumb. This match was the precursor of the Lucifer, which, like its friend, was the old sulphur match more neatly fashioned, and coated with an inflammable paste containing phosphorus.

It is not known who first suggested the substitution of phosphorus for sulphuret of antimony, but it proved a most important step, as the friction necessary to produce ignition was so great that the inflammable composition was often torn off by the sand paper.

Boyle and Hook are the first who allude to the use of phosphorus for producing light soon after its discovery in the seventeenth century; and it is known that Godfrey Hauckwitz, at his laboratory in Southampton Street, Strand, manufactured and sold large quantities of phosphorus for this purpose.

The Phosphorus Match, or Phosphoric Paper, as it was first called, underwent various modifications,—mixtures of phosphorus, with magnesia, lime, sulphur, white wax, cork-powder, &c., being all in turn recommended and employed. Chlorate of potash was added, which caused a noise when the match was used, but this detonating action was overcome by a mixture producing a slower combustion, and these matches were called *Congreves or Noiseless Lucifers.* The public have, however, adopted the latter designation, and thus we arrive at

The Lucifer Match,—The manufacture of which now embraces two branches,—the production of the match itself, and that of the boxes which contain them; the latter are often not united in the same works, but made "out of the house," and at the houses of those employed. The same division of labour also prevails more and more in the making of the match, the cutting of the wood into the *splint* having become a distinct business. T. R.

(*To be continued.*)

OURSELVES.

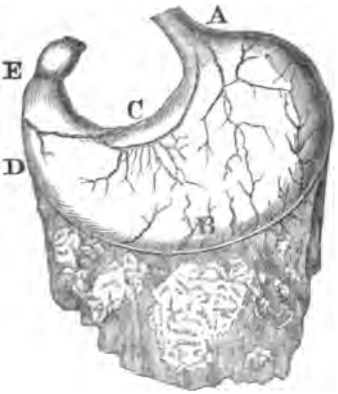
NUTRITION (*continued*).

After the busy Tongue has jostled a portion of food from one side of the mouth to the other, subjected it to the action of the teeth, to a due admixture of saliva, and to the scrutiny of the sense of taste, it collects the fragments into a little heap on its upper surface; then, applying its apex to the roof of the mouth, it tilts, or rather perhaps squeezes, it into the Pharynx. If fluid is taken in a continuous draught, the sides of the Tongue are inclined slightly upwards, and form a channel for it.

Immediately, on receiving the morsel, the muscles of the pharynx close upon it and force it down into the œsophagus. During this act, the other openings which lead into and out of the pharynx become simultaneously shut up, and so, except on special occasions, the food seldom goes the wrong way.

The *œsophagus*, which extends from the bottom of the pharynx to the stomach, is a strong, membranous and muscular tube, dilatable and very sensitive. Its muscular coat is composed of fibres, arranged longitudinally and transversely. Their action is so nicely adjusted, and they fulfil the law of their action so obediently, that during the act of swallowing, each portion of the canal becomes first enlarged to receive the morsel, and then contracted above and upon it; by which alternate and successive movements, it is urged continuously downwards and propelled into the stomach. The inner lining of the tube lies in plaits, which allow of its easy distension.

That much-abused but very important organ, the stomach, is the principal functionary in the business of digestion. In some form or other this viscus exists in almost every animal; and, hence, it may be properly considered as characteristic of the class. Its appearance, even in the human person, is not prepossessing. It has been likened to a leathern bottle, and to the air-receptacle of a bagpipe: it is not unlike, nor much like either. In an adult it will hold from two to four pints.



Its general form when moderately distended, is shown in the annexed figure; and the letters indicate the parts specially named by anatomists. A is the Cardiac portion and orifice; so called, and for no other reason, because they lie under and near the Heart: at this opening the œsophagus terminates. B, the greater Curvature; from it depends a large duplicature of the Peritoneum—the lining membrane of the Abdomen—called the *Omentum*, which commonly contains a good deal of fat, and is sometimes overloaded with it. C, the lesser Curvature. D, the pyloric portion, and E, the Pylorus, or watchman; so named from the almost instinctive vigilance with which it notices the exit of the food from the stomach. A part of the space between the Cardiac portion and the lesser Curvature, extending a little farther than C, is occupied by the *Little Omentum*, not shown in the sketch. It is another fold of the peritoneum, and extends to the Liver.

A very little care in the dissection shows that the stomach is formed of three principal coats or tunics; a serous, a muscular, and a mucous or villous coat. The serous* is the outermost. It is white, smooth, moderately dense, and almost transparent, like the Peritoneum, whence it is derived. Within this, and united to it by cellular membrane—the great packing material of the whole fabric—lie three strata of muscular fibres, arranged obliquely, circularly, and longitudinally; these form the muscular coat. A soft spongy membrane, of a reddish-white colour, having rather a marbled appearance, lines the interior. When the stomach is empty, this coat wrinkles up into little folds or rugæ, which give it a puckered appearance. If examined by the microscope it is found to be pierced, all over, with a multitude of small holes, the openings of minute tubes or pores, disposed very regularly, in quincuncial order, or groups of five. These groups are separated from one another by partitions, which give the surface the appearance of very delicate net-work. The pores are supposed to yield the *gastric juice*, a singular fluid, possessing most remarkable properties.

The inner surface is also dotted, and especially along the greater and lesser curvatures, with numerous follicles, from which exudes a semiviscid mucus, by which the interior of the stomach is kept constantly moist.

Several large arteries, much larger than its structural volume requires, supply the stomach abundantly with blood. When it is empty, they are tortuous and bent, and then the current of the blood is retarded; on the assumption of food, by which the stomach is distended, they become straitened, and then the flow of blood is more lively. The veins are mostly counterparts of the arteries.

In common with the tongue, the pharynx, the lungs and the heart, the stomach derives some of its nerves directly from the brain; and in common with the viscera of the chest and abdomen, it is largely supplied by the great sympathetic nerves. Hences arise its great sensitiveness; the singular sympathy with which it regards every other organ in the body; its seeming consciousness of the necessities of the whole fabric; the influence which, directly or indirectly, more or less, it exercises over every mental and bodily function; their reflex influence on its condition; and, in no inconsiderable degree, the feeling with which they reciprocate its ill or well being.*

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* This term is applied to membranes which pour out a thin watery fluid called *Serum*.

At the pyloric orifice, shown in the sketch at E, the *intestinal canal* is united to the stomach. In the human person this canal is about thirty-five feet long. It is naturally divided into two distinct portions, the small and large intestines; which are again subdivided, by anatomists, for description's sake. The small intestines consist of the *Duodenum*, so named because it is about twelve inches long; the *Jejunum*, usually found empty (hence its name); and the *Ileum*, called so from its numerous convolutions. Their general structure is nearly alike. Like the outer coat of the stomach, their outer coat is smooth, nearly transparent, and serous, and is derived from the peritoneum. All the fibres of the muscular, the second coat, are disposed transversely or circularly. A third coat, consisting of cellular membrane, forms a stratum, in which the blood-vessels and nerve-fibres, with which the whole canal is richly supplied, pass and ramify: on this account it is called the nervous or vascular coat.

There is a good deal of difference in the appearance of the mucous membrane, the fourth coat with which the interior is lined, in different parts of the tube. It is thicker than the inner lining of the stomach; but, like it, is covered, everywhere, with a delicate network. Little portions of the lining from two to six lines broad, folded together, form an irregular series of crescent-shaped ridges. They are called *Valvulæ conniventes.* These ridges, or imperfect valves, which are large and numerous in the duodenum and jejunum, become fewer and smaller in the ileum, and disappear altogether, before that part of the canal ends in the large intestines.

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* A volume might be written on the nature and consequences of this curious relationship.

Innumerable villosities stud the whole inner surface; they are little pendulous pellets, formed of the velvet-like pile of the mucous membrane. In the intervals between them, are numerous mucous glands and follicles, which pour out a lubricating moisture. The termination of the ileum, the final portion of the small intestines, is very abrupt. It is, as it were, pushed at right angles, into the side of the colon, one of the large intestines, beyond the surface of its inner lining. The projecting piece forms a circular flap, which answers all the purposes of a valve.

Anatomists distinguish the large intestines, which are about seven feet long, into three parts, the Colon, the Cæcum, and the Rectum. They are thicker, stronger, and a good deal more capacious, than the small intestines. Those fibres of their muscular coat which are arranged longitudinally, are collected into three bands, which, being shorter than the canal itself is, pucker it into a series of pouches or cells. A layer of fibres arranged circularly, more numerous however in some parts than in others, surrounds the whole tube. On the inner surface there are but few of the villi, which we noticed as being so numerous in the small intestines, nor are there any falciform valves; it is however marked all over with the orifices of numerous little tubes and mucous follicles.

The *Cæcum* lies in the interior of the right-haunch bone. It is a *cul-de-sac,* having its concavity undermost. Attached to it is a little appendage, from three to four inches long, called the *Appendix vermiformis*, or worm-shaped appendix.*

If the valvular termination of the small intestine did not cause a natural division, the distinction into colon and cæcum would be almost an arbitrary one, for there is little or no difference in their structure. The colon, in fact, is but a continuation of the cæcum. Arising from it, it passes upwards as high as the ribs, then crosses to the left side of the abdomen, and forms what is technically called the transverse arch: again turning downwards and backwards it bends like the Greek letter ς, and ends in the rectum, just on the margin of the pelvis. P. S.

REVIEW OF THE MONTH.

To Mr. Mombert we are indebted for a translation of Tholuck's "Commentary on the Psalms." Clear and succinct, and combining masterly exposition with deep devotional feeling, it will be welcomed by those who wish to sing the songs of Zion with understanding, or to read them with hearty appreciation. To those who want a key to the Prophetical Scriptures, we commend Dr. Fairbairn's "Prophecy viewed in respect to its distinctive Nature, its special Function, and proper Interpretation,"—a fine specimen of unostentatious learning, profound thought clearly expressed, and sound Christian philosophy. In his "History of the Jewish Nation after the Destruction of Jerusalem under Titus," Dr. Edersheim has supplied information which the English reader will hardly find elsewhere. To trace the fortunes of the peculiar people in the lands of their dispersion needed no ordinary industry and enthusiasm. These Dr. E. has brought to his task, which has evidently been a labour of love, and the result is a vast amount of research condensed into a well-written narrative. If we have any fault to find, it is that the learned author has poured forth his stores with a profusion, which, however acceptable to the student, is almost bewildering to the popular reader. "Sacrifice, or Pardon and Purity through the Cross," by the Rev. Newman Hall, is a brief view of the Atonement, simple and Scriptural, and rendered especially valuable by its practical tone: to which we have a companion or counterpart treatise, in Dr. Candlish's "Christian's Sacrifice," marked by all its author's originality, energy, and elevated feeling; a searching and rousing little volume. "The Shepherd King" is the story of king David, told to the young by the excellent authoress of "The Folded Lamb;" and the name of Dr. Cheever alone will secure numerous readers for his charming "Lectures on Cowper."

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* The mention of this appendage would have been hardly necessary, as its use is not known, but it is tubular, and has an orifice which opens into the cæcum. Occasionally the hard stones and larger seeds of fruits pass into and become impacted in the tube. They not unfrequently induce inflammation and death. An instance which came within the knowledge of the writer of this paper arose from the inadvertent swallowing of the stone of an olive.

With its racy anecdotes and rich Saxon English, Lord Cockburn's "Memorials of his Time" will be one of the most popular, as it is certainly one of the most amusing books of this season. Owing to the wonderful growth of their cities, and the many ebbs and flows of opinion and feeling, there is no country in which travels become so rapidly obsolete as amongst our Transatlantic cousins; but in "America, by River and Rail," Mr. Ferguson has described the great Republic as it existed a few months ago. With his access to the best information, and with his very various points of view,—religious, social, commercial, and scientific,—there are in Mr. Ferguson's work more diversified and authentic details than any ordinary tourist could supply; whilst his bright and cheerful spirit, and his sympathy with "whatsoever things are honest, and whatsoever things are lovely," render him a delightful fellow-traveller. Mr. M'Gilchrist's "History of the Turks" is an animated sketch of a wonderful story, rehearsed with conversational vivacity, and sufficiently comprehensive for all ordinary purposes. We are delighted to recognise a new poet in Mr. Stewart Lockyer, the author of "St. Bartholomew's Day, and other Poems." For music, freshness of fancy, and depth of feeling, we have seldom read anything finer than "Tintoret and his Daughter," "The Church Bell," "The Monks of Burnside," and "Stradella."

A delightful feature of the age is the tone of our highest periodical literature. With contributors like Rogers and Stanley, a wonderful change has come over the "Edinburgh" and "Quarterly" since the day that the one jeered at all faith, and the other at all religious earnestness. For the last twelve years two younger contemporaries have done good service to the cause of Christian progress; the "British Quarterly" with a succession of papers, the most admirable antidotes to modern infidelity which have appeared in England, and the "North British," as profound in mental philosophy as it is masterly in physical science, and bold in grappling with the social problems of the age. And we have now to welcome in the "London Quarterly" another, which, judging from its recent numbers, promises to contribute equal talent to the same great cause. The variety, the vigour, and the eloquence of its articles, can hardly fail to secure for it fame and permanence.

Many of our readers have a lively remembrance of little monographs on "Parrots," "Humming-Birds," and

"Pigeons," which have from time to time appeared in our pages. The keen fond eye, which watched the habits and revelled amid the chromatic splendours of the winged creation, can observe them no more; the cunning hand which described them is cold. Little more than a fortnight after the publication of the last of these papers, viz., on the 17th of May, Mr. James Wilson died at Edinburgh. He was an adept in nearly all the departments of physical science; and most of the articles on Natural History in the "Encyclopædia Britannica" are, in part or in whole, from his pen. Refined, sagacious, witty, full of information and kind-heartedness, he was a perfect Christian gentleman; and no compositions of the kind could be more delightful than his "Yacht-Voyage round the Coasts of Scotland," and his contributions to the "North-British Review" .on Birds, Fly-fishing, and similar subjects. From an interesting sketch in "The Witness" newspaper, we find that "shortly before his death he calmly arranged all his affairs, leaving messages for his friends, and mingling with them announcements of his faith in Christ crucified as the only ground of hope. Among the passages in Scripture he last dwelt upon were the words, 'Faint, yet pursuing,' and 'Looking unto Jesus.' A few hours before his death, he said, 'There is no darkness in the valley; all is brightness.' . . . 'Christ the hope of glory.' 'There is none other name given under heaven, whereby men can be saved.' In a few minutes he added, 'Eye hath not seen, nor ear heard, neither hath it entered into the heart of man to conceive, the things which God hath prepared for them that love him.' And not long after uttering these words, at early dawn on Sabbath he fell asleep in Jesus, so calmly that those around him knew not when he departed, to be for ever with the Lord."

The Eyry of the Golden Eagle.

THE EAGLE.

EAGLES are now comparatively rare birds in this country, except in Zoological Gardens. Fifty years ago no one could visit the mountain parts of Great Britain and Ireland, without seeing some specimens of the Golden Eagle soaring among the mountains, or pursuing their prey over the ridgy sides of Welsh and Scottish hills. The Sea Eagle, too, was not an uncommon bird on rocky coasts, now all but deserted by his lonely majesty. Civilisation, the great enemy of Rapacious Birds and Beasts, and continued persecution, have rendered our two largest birds of prey well-nigh strangers to these lands. The sheep-farmer and the deer-stalker unite in destroying the noble game; even the collector of birds' eggs is content to import his specimens from the nests of eagles which have bred in Norway or some more southern land. Bears and wolves have long since been extirpated; golden eagle, sea-eagle, and osprey, are likely soon to be numbered in the lists of former occupants. The naturalist, the artist, and the sportsman, lament their rarity, but the sheep-owners, and, if tales be true, the mothers of sweet little children, have every reason to rejoice.

There are many species of Eagles in the world; at least eight are indigenous to southern Europe. Like monarchs they require large space for their wings and domains, and in no part of the earth are they abundant. They prefer mountainous regions, for there they can nestle securely, and in such a position they can alone find a fit centre for their operations. The eagle

> "Is the sultan of the sky; and earth
> Pays tribute to his eyrie."

The Poet Laureate describes him well:—

> "He clasps the crag with hooked hands;
> Close to the sun in lonely lands,
> Ring'd with the azure world, he stands.
> The wrinkled sea beneath him crawls;
> He watches from his mountain walls,
> And like a thunderbolt he falls."

Any one, who has gazed upon the great North Sea, from that dizzy precipice the Noup of Noss in Shetland, has seen the haunt of our sea-eagle, even although he may be disappointed in seeing the birds themselves,—off, perhaps, on some excursion of pleasure to the nearest mainland, that of Norway, or resting for a while on some rock near Iceland. It can be no want of food that tempts him to wander, for the Shetland seas abound with fish of all kinds, and the lofty rocks are, in places, white with birds. The eagle, though she "wanders from her nest," is very constant in her attachment to its site, and the same pair have been watched for years, rearing their young in the same spot,—pictures of constancy and natural affection, worthy of being copied from characters otherwise ferocious.

The male eagle, like the male of most birds of prey, is smaller than his mate, and it requires the lapse of two or three years before eagles acquire their perfect plumage. In books, not older than that of the worthy Bewick, the golden eagle is figured under two names, while the sea-eagle was believed to form two species, now known to be old and young of the same bird. The Scriptures allude to this differently-coloured moult of feathers, and infer, in that way so peculiar and so characteristic of Holy Writ, that strength increases with the change of plume. Christopher North exclaims, —and the late Edinburgh Professor had studied the birds in their native haunts,—

"Oh for the Life of an Eagle, written by himself! Proudly would he, or she, write of birth and parentage. On the rock of ages he first opened his eyes to the sun, in noble instinct affronting and outstaring the light. The Great Glen of Scotland—hath it not been the inheritance of his ancestors for many thousand years? No polluting mixture of ignoble blood—no, the golden eagles of Glen-Falloch, surnamed the sun-starers, have formed alliances with the golden eagles of Cruachan, Ben-Lawers, Shehallion, and Lochnagar—the lightning-glints, the flood-fallers, the storm-wheelers, the cloud-cleavers, ever since the deluge. The education of the autobiographer had not been intrusted to a private tutor. Parental eyes, beaks, and talons, provided sustenance for his infant frame; and in that capacious eyrie, year after year, repaired by dry branches from the desert, parental advice was yelled into him, meet for the expansion of his instinct, as wide and wonderful as the reason of earth-crawling man. What a noble naturalist did he, in a single session at the college of the cliff, become! Of the customs, and habits, and haunts of all inferior creatures, he speedily made himself master—ours included. Nor was his knowledge confined to theory, but reduced to daily practice. He kept himself in constant training,—taking a flight of a couple of hundred miles before breakfast, paying a forenoon visit to the farthest of the Hebride Isles, and returning to dinner in Glenco. In one day he has flown to Norway on a visit, and returned the next to the head of the Cambrian Dee. He soon learned to despise himself for having once yelled for food, when food was none; and to sit or sail, on rock or through ether, athirst and an hungered, but mute. The virtues and fortitude have become with him, in accordance with the Aristotelian moral philosophy—habits. A peripatetic philosopher he could hardly be called—properly speaking, he belongs to the solar school—an airy sect, who take very high ground, indulge in lofty flights, and are often lost in the clouds."*

The quill and tail-feathers of the golden eagle are used in the Highlands of Scotland as ornaments to the bonnet, and seem to suit well that simple covering of a manly head. The Indians who wander over the north-western prairies of America kill this eagle for the express purpose of decorating their persons and their implements of war with its tail-feathers.† Only the other day, such feathers were very prominent ornaments of the persons of four full-dressed

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* "Recreations," iii. 44.

† Audubon's "Birds of America," i. p. 51. (ed. 1840.)

Indians, now exhibiting themselves in London, and walking, conspicuous objects, across New Oxford Street.

Many noble species of the eagle tribe may now be seen in the Regent's Park, as fat, if not happy, as eagles in a roomy cage can ever look. The following sentences may enlighten our readers on the manners of a conspicuous member of the distinguished race, there imprisoned. The habits of all eagles are closely similar to those of the fine species, once abundant at our antipodes. The Wedge-tailed Eagle of Australia (*Aquila fucosa*, Cuv.) seems to take the place, in the southern hemisphere which the golden eagle occupies in the northern. The bird is even bolder than our eagle, and has certainly a more pleasing form from the great length of the wedge-shaped tail, which does not detract from its sombre dignity. Mr. Gould,* its historian, killed one which measured six feet eight inches from tip to tip of its pinions, and is certain he has seen specimens considerably larger than the one referred to. He tells us that the natural disposition of this Eagle leads it to frequent places remote from the sea, and that its nest is placed on the most inaccessible trees, and is built or rather matted with sticks and boughs. He never succeeded in getting the eggs, as the aborigines of Tasmania, who had the power of ascending such trees, are now removed, and no European can mount a tree-stem which rises more than a hundred feet before it gives off a branch, and it is on such trees that the wedge-tailed eagle forms its flat aerie. From Mr. Gould's masterly work, the following interesting information is derived:—

> "It preys indiscriminately on all the smaller species of kangaroo which tenant the plains and the open crowns of the hills; and whose retreats, from the wonderful acuteness of its vision, it descries while soaring and performing those graceful evolutions and circles in the air, so frequently seen by the residents of the countries it inhabits; neither is

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* "Birds of Australia," vol. i.

the noble bustard, whose weight is twice that of its enemy, and who finds a more secure asylum on the extensive plains of the interior than most animals, safe from its attacks; its tremendous stoop and powerful grasp, in fact, carry inevitable destruction to its victim, be it ever so large and formidable. The breeders of sheep find in this bird an enemy, which commits ravages among their lambs; and consequently, in its turn, it is persecuted unrelentingly by the shepherds of the stock-owners, who employ every artifice in their power to effect its extirpation; and in Van Diemen's Land, considerable rewards are offered for the accomplishment of the same end. The tracts of untrodden ground, and the vastness of the impenetrable forests, will, however, for a long series of years to come, afford it an asylum, secure from the inroads of the destroying hands of man; still, with every one waging war upon it, its numbers must necessarily be considerably diminished. For the sake of the refuse thrown away by the kangaroo-hunters it will often follow them for many miles, and even for days together. I clearly ascertained that although it mostly feeds upon living prey, it does not refuse to devour carrion, or animals almost in a state of putridity. During one of my journeys into the interior, to the northward of Liverpool Plains, I saw no less than thirty or forty assembled together around the carcass of a dead bullock,—some gorged to the full, perched upon the neighbouring trees, the rest still in the enjoyment of the feast."

Mr. Backhouse* gives us an instance of a woman having been chased by a wedge-tailed eagle for some distance, and tells us she was forced to run to a house for shelter. The wife of a settler informed this philanthropic traveller and naturalist, that she was one day struck with the action of a horse in an inclosure, and noticed, as it galloped rapidly backwards and forwards, that it was chased by two eagles. The horse at last fell, and was pounced upon by one of these birds, which was only driven away by two or three men coming up.

After such a narrative, few can doubt the capacity, as well as the will, of a large eagle to carry off a child, though there may be much doubt as to the truth of many of the tales of mothers having climbed to the nests, and recovered their offspring uninjured.

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* "Narrative of a Visit to the Australian Colonies," p. 153.

Magnificent as the eagle is, and celebrated for its nobility, truth compels the naturalist to say, that the "Bird of Jove" is often a great coward, and as satisfied with carrion as any ignoble vulture of the true type of the scavenger. And yet, says one* who had sometimes seen him among the brown hills of Albyn, "The eagle is a magnificent bird, and when met with on some grim Alpine crag projecting from the grey mist, inspires a kind of respect, of which some degree of fear is an essential ingredient." When seated a prisoner in a cage of the Zoological Gardens the eagle has a ferocious aspect, with those bright eyes gleaming from below the arched eyebrows, and that hooked beak, corresponding in strength and massiveness with the crooked talons and great expanse of wing. The poet Campbell† may well exclaim :—

"There's such a charm in natural strength and power,
That human fancy has for ever paid
Poetic homage to the bird of Jove.
Hence, 'neath his image, Rome arrayed her turms
And cohorts for the conquest of the world.
And figuring his flight, the mind is fill'd
With thoughts that mock the pride of wingless man."

Should any of our readers happen to visit the Zoological Gardens when the birds of prey are fed, let them look on the Harpy Eagle of South America (*Thrasaëtus destructor*) at such a time. Always peculiarly truculent in aspect, he then looks like Ferocity personified. The crested head seems to expand; the membrane of the eye appears to pass and repass; the thick legs, and the deadly grasp of the talons, become conspicuous; and the visitor, looking at that foreshortened beak, as rapidly seen in profile, and then again foreshortened, can easily believe the narrative which relates, that the harpy at one blow can split open a horse's skull.

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* The late Professor Macgillivray, "British Birds," iii. 205.

† "The Dead Eagle," written at Oran.

"Who dare meddle me?" is written on these fierce features as clearly as if the words were spoken by the "soul of fire." It is a pity that the bird was not a native of the United States. Had the noble tyrant been found there, no citizen of the States would have adopted the cowardly White-headed Eagle (*Haliaëtus leucocephalus*) as his representative.

This bird's predatory habits are depicted by Alexander Wilson with rare interest of description; for the reader follows the fish-hawk with his sympathy, and would feign deliver the diligent bird from this white-headed hoary thief. Well may Benjamin Franklin refer to the "bad moral character" of this badge of America, "which does not get his living honestly." "Besides," adds the shrewd philosopher, "he is a rank coward; the little king-bird, not bigger than a sparrow, attacks him boldly, and drives him out of the district. He is, therefore, by no means a proper emblem for the brave and honest Cincinnati of America."

In some of our European states the eagle is the national emblem, and under its expanded form—sometimes gilded, sometimes black, now with one head, and now with two—deeds of rapine have been perpetrated which have deluged the world with blood.

Truly "where the carcase is, thither are the eagles gathered together." So was it that the Romans, one of whose chief standards was an eagle, came down on the decayed remnant of the Jewish nation, as prophesied by Him whose word is truth (Matth. xxiv. 29); and so will all who oppose that word, and "neglect so great salvation," be yet destroyed. (Luke, xvii. 37; Rev. xix. 17, 18). The eagles of other lands invite our attention; some soaring in South Africa, the land of antelopes and of heaths; others, like the Mhorungah of India (*Aquila Bonelli*), among the ranges of the Ghauts, pouncing on game, and not even despising to capture pigeons. Dr. Horsfield, that venerable naturalist, could show us the Javanese Sea-Eagle (*Pandion*

Ichthyaëtus) suspended in the air over some lake in Java, or sailing slowly along as he watched his fishy prey.* With Alexander Wilson or Audubon as a companion, the reader might linger over the recital of the deeds of North American eagles. In South America, Waterton and Natterer, Spix or Wallace, might be his attendants. We would advise him to take Gould as his guide in Australia, while Hewitson and Charles St. John, or even Christopher North, would teach him much, from personal observation, of the habits of our golden and sea-eagles. There are many eagles, each one distinct in face and in figure, and all of them in beak, in talon, in expanse of wing, in breadth, or pointedness of tail, and even in contour, admirably adapted by their Maker for the sites where He has placed them. The Scripture abounds with illustrations derived from the eagle. Nebuchadnezzar, that great monarch, is referred to by the prophet Ezekiel (Ezek. xvii. 3) as "a great eagle, with great wings, long-winged, full of feathers, which had divers colours;" while Isaiah, referring to the same King of Assyria, prophesies that "the stretching out of his wings shall fill the breadth of thy land, O Immanuel." To "mount up on wings as eagles," is imagery as poetical, as it is powerful and true to nature. The mode in which the eagle trains its young has been described in Holy Writ by one who had, doubtless, observed the eagles as he fed the flocks of Jethro among the mountains of Arabia. Job and other inspired writers refer often to this bird and its habits. The Assyrians, as their monuments show us, used its head, and claws, and wings, as emblems of strength, ferocity, and swiftness. The Bible, from Genesis to the Apocalypse, has illustrations and imagery derived from the structure and habits of this powerful race of birds. It is the Lion of its class.

A. W.

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* "Zoological Researches in Java;" Catalogue of Birds in Museum of East India Company, i. p. 54.

A SABBATH WELL SPENT.

THERE is danger in Sabbath desecration. "Near a beautiful village in the State of New York," writes an excellent minister of our acquaintance, "there lived a farmer of wealth and respectability, but he was a sceptic. Whether he had been religiously trained we know not; but in the early part of his life he had been a regular attendant on the ordinances of the Sabbath. His health was remarkably robust, and had been all his life, being now about fifty years of age. You would have selected him among a thousand as the longest-lived, according to appearance. It was a clear and cloudless Sabbath morning when the farmer set out to gather his hay. He had a lông bridge to pass before he reached his fields. The gate-keeper gently reminded him of the sacred obligation of the Sabbath, and of the great guilt of thus labouring on the Lord's day. He tossed his head, and replied that he had not been to church for sixteen years, and that he paid the workmen twelve cents extra for what they did on the Sunday. He was reminded that life is uncertain. 'Why,' he replied, 'I am such a knot of hardy health, Death himself has not an arrow which can pierce me.' During the afternoon, however, the skies began to darken, and a summer shower seemed rising to water the earth. The farmer, with all his hands, strained every nerve to finish their work and secure the hay. He was labouring with all his energy in building a stack, when a sudden flash was seen; the bolt descended, and all was over. There lay the Sabbath-breaker—dead, and his sins sealed up to judgment. I saw his funeral slowly winding along the borders of the beautiful meadows which yesterday he owned, and I wondered if his spirit thought it wise *then* to violate God's law."* There is danger in Sabbath-breaking. The Sabbath is sacred, and to desecrate it is to dishonour Him who claims it as His own. Sins against society God leaves it to society to punish, and therefore it is seldom that the hand of Omnipotence strikes dead in the very act the thief or the murderer: but sins directly against Heaven's Majesty are from time to time visited at the moment, that a salutary fear may fall upon transgressors. Not always—for that would put an end to human liberty; but often enough to inspire with a certain awe human temerity. An Achan, an Ananias practically defies the Divine omniscience; that omniscience vindicates itself in his destruction. A Korah rebels at the Divine sovereignty, and the earth opens her mouth and swallows the rebel. Uzzah handles the sacred ark as if it were a common chest, and the Lord smites him, and he dies. Multitudes may have perpetrated similar offences with impunity; but these and similar examples occur, ever and anon, that sinners may fear and forbear. So it is no superstitious sentiment we try to awaken; but, knowing the frequency of instances akin to the one now quoted, it is to the reverential instincts and sober reason of every one who is tempted to desecrate God's day, that we appeal in saying, Take care. This desecration is very dangerous. The day belongs to God, and if you assail it, He may avenge it in *your* person. Take care that you be not the Uzzah of this ark, the Korah of this controversy. Take care that it be not recorded in your epitaph, that in the upsetting of that pleasure-boat, or the collision of that excursion-train, you were the hapless victim of Sabbath-profanation.

But if sentence against an evil work is seldom executed thus speedily, the danger is none the less; for there are greater calamities than sudden and untimely death. The man who, fleeing from his creditors, flings himself into the nearest ship, may escape without paying his debts; but if it turns out that fever is raging on board, and he catches the deadly contagion; or if the vessel proves to be a corsair, and the adventure ends in his being sold to life-long slavery, he has no reason to boast of his luck or his agility. And just so: it would have been well for many a Sabbath-breaker, if, in his first daring act of transgression, the stroke of vengeance had laid him low; for then he would have died comparatively innocent. But sentence was not executed speedily, and so his heart was fully set in him to do evil. He absented himself, for the first time in his life, a whole day from the sanctuary. That made it easier to remain away another. He spent that other in sauntering about the fields, or, with a little scruple at the first, he took up a newspaper or a novel. By and by he found himself in a tea-garden or a Sunday tavern. There he met with loose acquaintances,—companions who taught him to bet and gamble, to live beyond his income, to live on borrowed money or by dishonest means. And by and by he learned to live for pleasure. He became a frequenter of casinos and dancing-saloons; the associate of low and abandoned characters; a reveller, a nocturnal rioter, and consequently a neglecter of his daily duties—till now, perhaps dismissed from his employment, at least disliking his stricter and more virtuous friends, with a conscience deadened, an imagination polluted, a heart corrupted, he is manifold more the child of hell than at the outset of his ungodly career. To all young men amongst our readers we would earnestly say, Be careful of your Sabbath. Do not make acquaintance with those who mis-spend the hallowed hours, or whose visits would be the means of wasting yours. Do not accept invitations to pass the day with those whose standard of Sabbath observance is low, and under whose roof you might be tempted to do what you would not do at home. Beware of the beginnings of evil. Reading a work of science, listening to secular music, taking a walk with a frivolous companion, even wandering from church to church in quest of excitement, you may impair the sense of sanctity with which God's day has been heretofore surrounded. And once this is impaired, other evils are sure to follow. It is almost certain that a wasted Sabbath will be followed by a worldly-minded week. On the morrow you will rise with a gloom in the atmosphere, a cloud on your conscience. You will have little heart for prayer, and the scanty pretence will grow more and more formal. And the more that prayer is restrained, the farther away will God's Spirit depart. You may almost feel Him go. Your heart is getting dry, earthly, dead. You are learning to dislike earnest Christians, and you are beginning to see that there is such a thing as righteousness overmuch. Nay, without knowing it, you are a kind of infidel already. You believe that the received account of man's ungodliness is extreme ; you cannot help hoping that there is some other way in which men may be saved besides through Jesus Christ, and you wish that there was more value attached to natural goodness, and less ado made with the Bible. God's Spirit is grieved. The great realities are no longer in contact with your mind, and, losing faith, you may soon lose the fear of God. Losing the fear of God, what is there of which you might not be capable ? Come with us to this hospital, and see this young man, once virtuous, once a church-goer, nay, once a communicant. See him as there he lies in agony, his bones filled with the sins of his youth, and his memory crowded with a strange medley,—the village sanctuary, his pious mother, his little sister-playmates, mingling with the horrid orgies and vile companions of later days, like a dream in which heaven and hell float through one another. See him as he tosses there, his eye wild with pain and remorse together, and see the fruits of Sabbath-breaking: for *his* were virtuous friends, till idle and ill-spent Sundays introduced him to the vicious. Come with us to this asylum, and see that poor imbecile. Once a prosperous trader—once master of his own handsome villa, where graceful hospitalities awaited welcome friends—once a man of sense, intelligence, and taste—how is it that he is now, in sordid attire, a trembling, phantom-haunted maniac, in a pauper hospital? He began with broken Sabbaths. Partly exhaustion, partly indolence, he rose occasionally too late for the house of prayer, till the omission grew more frequent; and deprived of the calm restorative which devotion used to bring, and not altogether well at ease within, he sought to cheer his flagging spirits with strange fire. His associates grew more jovial, his habits more convivial; till at last Sabbath afternoons became seasons of habitual revelry. And somehow business felt it. Now that the Sabbath filter was out of order, his mind grew muddy, and now that communion with Heaven had entirely ceased, his moral tone fell lower; and, walking contrary to God, God walked contrary to him. Things went wrong, and, having let slip his better friends meanwhile, he could not get these things right again. His refuge was his deeper ruin. "I will seek it yet again." He sought it, and was once more bitten. But "no cure like a tooth of the snake that stung me," till now, with shattered nerves and addled brain, a cure can be no more hoped for. Come with us to this police-station, where, stark and stiff, in dripping clothes, they are carrying in the corpse found in the river this Sunday morning. Remove from the swollen face the veiling kerchief, and identify the form from which an immortal spirit has so lately passed away to the presence of the Judge. The chest is broad, the brow is high, and it would have been long before years had blanched or thinned those locks so dark and massive. Who were his murderers? The providers of Sunday entertainments,—the masters of the Sunday revels. These drew him from the home of virtue and the house of God. These led him into expense, extravagance, embarrassment. Through the billiard-room, the race-course, and the money-lender's office, these have dragged him up to the very prison-door; till, rather than confront the Monday's exposure and disgrace, a leap from London Bridge has cut the knot and closed the tragedy.

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* Van Doren's Mercantile Morals, p. 271. Similar facts are collected in a volume of Tract Society Anecdotes, entitled "Admonitions."

Young men, you who live in our crowded cities especially, you cannot esteem the Sabbath too holy or too honourable. The course of the world, the drift of the age, the open shops, the obtrusive desecration, the surrounding influences, all are adverse. But highest interests are at stake,—your temporal and eternal welfare is involved. As you arise and go forth, and pass along, just suppose that you are not solitary. Fancy that you feel on your shoulder the hand of a tender and God-fearing parent, saying, "This is the way, walk in it." Nay, listen,—it is no fancy,—listen to the voice of your heavenly Father, saying, "Remember the Sabbath-day to keep it holy. Do not thy pleasure on my holy day."

But if there is danger in Sabbath-desecration, there is great delight in Sabbath-keeping.

Here is a boundary wall, high, dark, and solid, with a row of spikes running round the coping. Immediately within the wall extends a tangled copse or bushy wilderness, by no means inviting; and every here and there is set up a "Warning to Trespassers." But yonder is a stately gateway, with a handsome lodge; and, under escort of some member of the family, you enter, and up the shady avenue with its gravelled path and turfy border, you pass to the splendid mansion, with its costly collections, its refined society, its beautiful prospects, its gardens swimming with fragrance and flaming with exquisite flowers. You are now a member of the family; there is no fear that you will wantonly deface or damage anything; and the lord of the manor says, "All things are yours. Make yourself at home. Walk at liberty."

Something like this are God's inclosures in our world. The Christian Church appears blank and uninviting to spectators from without, or it actually frowns and looks formidable. Worldly men observe the outside wall, built up of texts and tenets, and coped with warnings and threatenings, and to them it looks exceedingly dull and dreary: just as the park inclosure has appeared to yourself skirting it mile after mile on the dusty highway. But when, through the door of faith you really get within, what a delightful discovery! A propitious God, a peaceful conscience, the society of the saints, the hope full of immortality, all the holy and happy emotions which the blessed Comforter inspires — a perfect paradise restored. Now that you are inside of this garden inclosed, you almost lose sight of the boundary wall which once looked so sombre, or if you glimpse the once-deprecated warnings and dreaded decrees, now that your feet stand safe within the precincts of salvation, and now that you view them through vistas of great and precious promises, their aspect is utterly changed. Introduced by the Heir Himself, you are welcomed by the Lord of the land: "All things are yours, for ye are Christ's. Yours is the kingdom. Eat and be satisfied. Inherit the earth."

So, too, with the Sabbath. It is also a sacred inclosure; and although there is an impression among the more respectable passers-by that it is a good and useful institution, there is a very common prejudice against it. Knowing only the outside of it, many speak of it as dull, puritanical, gloomy; and when they come to the notices here and there erected, with the royal arms above and the "caution to trespassers" beneath, a certain resentful or impatient feeling rises in their minds, and they are almost tempted to imitate those disloyal subjects, who from age to age have hurled their missiles at the hated prohibition. But when a mind comes to be right with God, it sees that there is no way so good as God's own way,—no plan for the creature so wise as to fall in with the Creator's prescription; and this commandment, if a righteous requirement on the part of the great Governor, it also recognises as "holy" and "good" for the governed. Brought within the precincts, blessed with that inward peace and that complacency in God which are themselves sabbatic, the institution begins to wear the aspect of a privilege and a boon. Congenial with the new nature, and relieved from pains and penalties, its sanctity is safe in the guardianship of filial piety. To such it is "a delight, the holy of the Lord, honourable."

But although a devout mind is the best interpreter of the ordinance, and will be the best keeper of the command, it may not be amiss to revert to one or two principles which may help us to walk at liberty; all the rather that the necessities of the case have lately tended to resolve the ethics of the Sabbath very much into a series of prohibitions and restrictions.

The Sabbath, then, is "made for man," and for man who is made up of soul and body. To this last, as well as to the former, it is designed as a restorative. If, therefore, you are over-wrought throughout the week, it is no sin to retire to earlier rest on the Sabbath evening, or to enjoy an hour of extra sleep on the Sabbath morning. Still happier is your lot if you do not need this, and if, like some of our pious fathers, you can make the best day of the week the longest. But it may be otherwise. You may be worn and weary, and without the renovation of ample slumber, even the Sabbath would be to you a less perfect delight. If so, —if it is not the drowsiness of the sluggard, but the sleep of the exhausted labourer you indulge, — take it, and bless the Lord of the Sabbath for the opportune refreshment.

But as the immortal nature is the chief part of man, the Sabbath was made chiefly for man's soul.

There is much of his own vigorous sense in the rules which Dr. Johnson laid down for his own Sabbath-keeping.

" 1. To rise early, and in order to it, to go to sleep early on Saturday.

" 2. To use some extraordinary devotion in the morning.

" 3. To examine the tenour of my life, and particularly the last week; and to mark my advances in religion, or recession from it.

" 4. To read the Scriptures methodically, with such helps as are at hand.

" 5. To go to church twice.

" 6. To read books of divinity, either speculative or practical.

" 7. To instruct my family.

" 8. To wear off by meditation any worldly soil contracted in the week." *

Yes, the Sabbath is the day for special devotion. Take time to pray, and, in order that prayer may not be a task, think of some topics : think of last week with its sins, its mercies, its prospered engagements, its seasonable supplies ; and think of the one now begun, with its duties, its wants, its temptations, its dangers, and in the name of the Great Intercessor ask help for the time of need. Think of your acquaintances, your relations, your fellow-worshippers, your suffering neighbours,—those friends who have asked for your prayers. Think of Christ's kingdom, and pray that it may come in this country, over the Continent, throughout the world.

* Boswell's " Johnson," by Croker, vol. ii. p. 56.

As the basis of self-culture, seek self-knowledge. Do I love the Lord Jesus ? Is the Gospel a reality to me ? Is my horizon brightened by its hopes ? Is God endeared by its kindness ? Do I grow in Christian excellence,— in activity, in usefulness, in the gainliness which commends the truth, in the superiority of purpose which sets forth its majesty ? Friends—do they increase ? and do my good offices multiply ? or do friends fall off, and do I deserve to lose them ? The sins that easily beset me—are they waxing stronger or weaker ? Pride, touchiness, procrastination, sloth, peevishness, detraction, love of good cheer, sensual indulgence — do they wax or wane ? or are old faults replaced by new ?

Such thorough and honest self-scrutiny would supply materials for prayer, and motives to the earnest reading and hearing of God's word. And with the supplicated aids of the Holy Spirit, it could hardly fail to result in perceptible progress and improving character.

Nor must we omit the methodical reading of Scripture—that book so deep, so broad; that all the expositions in the world will never exhaust its meaning, and although the last saints on earth will see in it wonders which escaped the whole of their predecessors, they will not see an end of its perfection. The Sabbath is the day for the study of the Book Divine,—for its full, deliberate, meditative perusal ; for getting a comprehensive view of its contents,—the drift of its arguments, the connexion of its narratives, the burden of its prophecies. This is the day for comparing Scripture with Scripture, for investigating those hidden harmonies, and those mutually supplementing discrepancies which show not only its accurate truthfulness, but the derivation of all its various parts from one central inspiring Wisdom. And whether with or without the help of versions and commentators, this is the day to examine texts hard to be understood, trying to add to your illustrated Bible a few letters of light, a few vignettes of beauty. On other days you may take from your store a few current coins; this day you go down into the mine, and you dig to add to your treasure. On other days you accept your morning portion, and are thankful for your daily bread; this day you go out into the harvest-field, and gather ears, and bring home sheaves, and bruise for future use heaven's bread-corn. On other days as a hasty pilgrim, you are fain to drink of the brook by the way, but you cannot linger; this day you lie down beside the still waters,—you draw plenteous draughts from the wells of salvation,—you drink of the river of God's pleasures; or your exulting soul expatiates in that ocean of truth on whose edge the little children wade, whose depths have not yet been sounded by the seraph with the longest line.

A large and delightful literature is now supplied to the Christian student. Theology has its great thinkers, Pascal, Vinet, Edwards, Chalmers, Foster. The Church of Christ has its instructive, though often mournful story, portions of it well told by Milner, D'Aubigné, and M'Crie. Religious biography is growing very rich in rousing or affecting records,—Doddridge, Martyn, Payson, Venn, Pierce, M'Cheyne, Hedley Vicars, and multitudes besides; whilst modern missions exhibit instances of self-sacrifice and triumphs of the Gospel over idolatry, crime, and brutish ignorance, in the experience of men like Eliot, Brainerd, Judson, Morrison, Williams, Moffatt, which it is hardly possible to peruse without feeling our love to the Saviour quickened, and our faith in the Gospel strengthened.

But a main ingredient in human nature, and one of the most precious, is the social affections: and the Sabbath is made for the Church and the family. The tendency of excessive toil is to render us joyless, hard, and selfish; but this timely rest, like a reviving dew, cools the weekly fever, and makes our better feelings expand once more; and he must be a churl indeed, over whose wife and children the light of Sabbath does not shed a peculiar endearment, and supply a new motive for an industrious morrow. The tendency of business, also, is to render us sagacious and too often suspicious; but it seldom fosters benevolence. The Sabbath supplies this want. It reveals us to one another in aspects and relations unknown during the money-making, bargain-driving week; and as those meet in the church who parted on the exchange, if in their common profession of Christianity they find new incentives to uprightness and integrity, in the prayers and praises which unitedly they offer they establish a tacit sympathy which even in harsher scenes will retain its softening influence.

Experience is constantly confirming the words of the wise and upright Sir Matthew Hale:—

"A Sabbath well spent
Brings a week of content,
And health for the toils of the morrow;
But a Sabbath profaned,
Whatsoever be gained,
Is a certain forerunner of sorrow."

But in order to a well-spent Sabbath, few preparations are so needful as a finished week and a well-spent Saturday. The Saturday is the Sabbath's vestibule; and if late hours, or riotous mirth, or excessive occupation, has absorbed us then, the Sabbath may be well-nigh spent before we get into its sacredness. On the other hand, a week in which engagements have been neglected or postponed,—a week, that is, in which we have not laboured the six days and done all our work,—is a bad preparation for the rest of the seventh. As poor Haydon testifies: "I always used to remark that the idlest students worked hardest on a Sunday. Call on them in the week, they were never at their studies; call on a Sunday, and you were sure to find them buried in all the grubbiness of dressing-gown and dirty slippers."* And among those who have too much conscientiousness to ply their ordinary avocation, arrears of work are a heavy incubus on Sabbath enjoyment. Try to imitate the Divine Author of the institution, who finished all His work, and then on the seventh day "rested and was refreshed."

And when the day arrives, seek to be "in the Spirit." It is *the Lord's* day. It would not be here if the Lord Jesus had not been here. It would not be here if the great Redemption had failed,—if the sacrifice of Calvary had been found insufficient for the sins of men, and if the benevolent Being by whom that sacrifice was offered were still a tenant of the tomb. But this morning's dawn, like a continual Easter, announces "the Lord is risen." It tells of atonement accepted; it tells of a Saviour ascended and a church redeemed. Nay, if that Saviour were not coming again, the Lord's-day Sabbath would not be here. But it speaks of a better rest which yet remaineth for the people of God. A relic of Eden that has survived the curse, it is a promise of new heavens and a new earth wherein dwelleth righteousness. It is a prophecy of better things not seen as yet, and no bad test of our own preparedness for them.

"Thine earthly Sabbaths, Lord, we love:
But there's a nobler rest above;
To that our labouring souls aspire
With ardent pangs of strong desire.

No more fatigue, no more distress;
Nor sin nor hell shall reach the place;
No groans to mingle with the songs
That warble from immortal tongues.

O long-expected day, begin;
Dawn on these realms of woe and sin:
Fain would we leave this weary road,
And sleep in death to rest with God."

J. H.

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* Autobiography of R. W. Haydon, vol. iii. 31.

THE FATAL WHISPER.

A WHISPER stole upon the air,
A vague, uncertain sound;
Loosely it floated here and there,
Sailing and circling round,
Like those light spider-threads that stray
About on a calm summer's day.

Wherever two or three were met,
It, eddying, near them drew;
And then, as if in motion set
By their lips' breath, it flew
Away to others, that like these
Caught it, and sent it with the breeze.

And thus it sailed and circled on,
A faint and formless thing;
Yet many felt when it was gone,
It left a trailing sting;
Such as the swimmer feels when he
Meets the medusa in the sea.

At length it lighted!—round the frame
Of a strong man it coiled:
His eyes, they flashed into a flame,
His bosom heaved and boiled;
His heart was seized with piercing pains,
His blood was poisoned in his veins.

Against this subtle foe he fought,
  But fought without avail;
Its nature and its source he sought,
  But only sought to fail:
Though many knew, yet none would speak,
To tell him where he was to seek.

Could he but trace from whence it came,
  He there might find its cure;
A breath, a hint, a word, a name,
  Might health and hope ensure;
But name, or word, or hint, or breath,
Comes not to shield his soul from death.

His spirits droop, his strength departs,
  His flesh falls off his bones;
Awake, he stammers and he starts,
  And in his sleep he moans:
He shuns the crowd; and, as he walks
Alone, unto himself he talks.

At last he sinks upon his bed,
  Never to rise again;
One thought runs through his weary head,
  And racks his wandering brain:
That Whisper faint, that vagrant sound,
Has brought the strong man to the ground!

The slander of a silly tongue
  Broke down a spirit brave;
Its poisoned folds around him clung,
  And dragged him to the grave:
While those who could have saved stood by,
And saw him perish by a lie!

W. M. G.

LUCIFER-MATCHES.

(*Concluded.*)

THE preparation of the inflammable materials, called in France "*pate*," and in England "composition," or in the language of the factory *compo*, is among the arcana of the manufacturers, each of whom has, if not ingredients, at least proportions, of his own. All these compositions, or pastes, may be said to be primarily emulsions, or homogeneous mixtures of phosphorus in a solution of glue or gum arabic; and a large quantity of matches are made in London and other great cities, for consumption among the poor, which consist simply of phosphorus, glue, and colouring matter, being at the same time the most dangerous and offensive.

In the large manufactories of Germany, gum from Africa or Italy is used in place of glue, and a nitrate of lead or peroxide of lead is the chief ingredient besides the phosphorus. These matches will not bear the humidity of our climate. The English manufacturers generally employ glue, phosphorus, and chlorate of potash, in large proportions, and some other ingredients not generally known, which appear to have the double property of diminishing the explosiveness of the mixture, and of giving to the match a hardness and power to resist moisture. The range of phosphorus, in the different dipping compositions, varies very much, in some cases, it may be 30, and even 50 per cent, in others the proportion will be very small,—perhaps as low as 10, or even 5 per cent, but in all it exists in sufficient quantity to render each single match a poison of fearful intensity.

None of the compositions which inflame without explosion contain chlorate of potash, but nitre and phosphorus, the latter burning, so to speak, at the expense of the oxygen of the former.

The following is one of the many mixtures formerly used for dipping the splint,—

Phosphorus	4	parts,
Nitre	10	,,
Fine glue	6	,,
Red-lead, or ochre	5	,,
Smalt	2	,,

which is prepared for use in the following manner :—

The glue is broken into pieces and kept in cold water for a few hours, when it is melted in a copper vessel heated by means of a salt-water bath. When it is quite fluid, the phosphorus is gradually added, which ought, however, to be always covered with water. The mass is kept in motion by a pestle furnished with brushes, increasing the rapidity of the agitation as the temperature falls, and at length an emulsion of finely divided phosphorus is obtained. The nitre, red-powder, and smalt, are then added in this order, the mixture being maintained at a temperature of about 100° Fahr. by a water-bath. The whole of the materials gradually form an uniform paste, which then may be almost drawn out into threads.

Gum may be substituted for glue, and prussian blue for smalt, while pure sand is occasionally employed. The mode of mixing and preparing the paste slightly differs according to the material employed as a mucilage.

The splints (to be hereafter described), having been well seasoned and made hot, are put into bundles and dipped into melted sulphur. They are then well shaken, to remove the excess, as so little sulphur is necessary that it is scarcely visible; and when dry they may be re-dipped in the igniting material, which forms the principal part of the match.

The composition and sulphur splints being now ready, the operation of dipping is conducted after two methods, viz., the *bundle dip* and the *frame or clamp dip*. In the first case, the dipper takes a bundle of splints, tied round with string, and grasping it in both hands, by a skilful motion, causes the ends of the splints to expand into so wide a circle that they become detached, and on being dipped each will receive its own separate portion of the composition. By this method it is the end of the match only which is covered with composition, and from the trifling consumption of material, as well as the cheapness of the labour, this kind of match is the least costly in manufacture.

Amorphous, or allotropic phosphorus, is found to answer admirably for this mode of manufacture, so that the cost of using it will allow of its becoming universal. The frame or clamp dip is, however, gradually displacing the bundle dip, at least in this country.

In the other mode of manufacture, the *frames or clamps* consist of separate strips of wood about fifteen inches long, one inch wide, and a quarter of an inch deep, one side of which is covered with woollen list and the other scored with grooves, about five in an inch, and each deep enough to receive a splint. A child will rapidly fill a grooved strip with splints; the list-covered side of a second strip keeps the splints in their places; and by a succession of strips of splints, a frame or clamp is quickly formed, which will hold 1500 or more matches, presenting a surface of about fifteen inches square. When well bound together, these frames full of matches are ready for dipping.

The paste is spread upon tables made of dipping-stone or metal by means of a roller or spatula, maintained at a uniform temperature by the heat of a water-bath. In other cases a slight iron frame, called a *gauge*, is placed on the dipping-table, into which the composition is poured until full, and thus the *depth* of the dip is regulated. A workman knows by practice how to manipulate the frame, so as to get out of the same " bed " of composition a succession of frames dipped to any equal depth, until at last the quantity removed has so thinned the " bed " that the " gauge " must be refilled.

In one of the extensive Austrian manufactories at a row of six or more dipping-stones half-a-dozen workmen are employed, who dip and hand back the frames to the attendant boy with such celerity that they can turn out the incredible quantity of twenty millions of matches per diem.

The frames, holding (say) 1500 matches, are now placed in a horizontal position, and allowed to dry for some time in the air. After the lapse of three or four hours they are removed to a stove, and suspended from iron railings, where they are exposed to a temperature of 80° or 90° Fahr., by means of steam or hot water. When glue is used, the desiccation is complete in two hours, but it occupies an entire day when gum has been employed as the mucilage. Each set of railings is covered with sheet-iron, to prevent combustion spreading in cases of fire, and the floor of the stove is kept covered with sand, to the depth of several inches, to extinguish any ignited match as it falls, or any which may take fire by the friction caused by the passing to and fro of the workmen.

As soon as the drying process is complete, the frames are carried to a workshop, where women and children remove the matches, and immediately deposit them in boxes. These work-people have always by their sides boxes half-filled with sawdust, in which they plunge any match ignited by accident, so as at once to extinguish the flame. They have also large and small cisterns in which to immerse their hands in case of accident. The phosphorus burn is of a dangerous character, and it ought to be

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generally known that nothing is better than a lotion made slightly alkaline with magnesia, or, wanting this substance, with milk of lime, or a solution of bicarbonate of soda, because these substances arrest the acidifying of the phosphorus, on which its corrosive action depends.

The Lucifer without Sulphur.—In making these matches, the wood must be more thoroughly dried than in the preceding kind, especially just previous to the last operation. The splints are placed in the usual frames, and the ends are brought for a moment in contact with a red-hot iron plate, so as to become slightly carbonised. They are then dipped in a thin layer of stearic acid or wax, kept in a fluid state in a flat-bottomed tinned-copper basin, by means of the usual water-bath. A small portion of the fatty matter is immediately absorbed by the ligneous tissues, and rises by the capillary force of the fibres. These ends are then covered by the inflammable paste in the manner already described.

The paste of these matches must contain less gum, and a more active oxydising agent than the other, while the reason of the previous preparation of the wood is necessary, as this inflammable composition burns too rapidly to set fire to the wood—a defect our readers may have noticed. The following is the composition of one of these pastes :—

Phosphorus	6	parts,
Gum	1	,,
Red-lead	4	,,
Sand	4	,,
Water	6	,,
Nitric acid	1	,,

The extra cost of the stearic acid is compensated by the much smaller quantity required compared with sulphur, the proportion being as 1 to 10.

Latest Improvement.—The most recent and important improvement in the manufacture of matches is that of Herr

Lundström, of Jönköping, who describes his process as follows :—The matches are dipped in the ordinary way in sulphur, stearine, wax, or spermaceti, and the following igniting material applied in the usual manner :—

Chlorate of potash . . .	6	parts,
Sulphuret of antimony	2 to 3	„
Glue	1	„

while the following composition is applied to the sides and other parts of the boxes which contain the matches, by means of a brush or small wood spatula, and may be called *the paste for the rubbing or friction surfaces,* previously coated with a compound of grit and cement :

Amorphous phosphorus	10	parts,
Oxide of manganese, or sulphuret of antimony	8	„
Glue	3 to 6	„

which thus introduces a novel feature into this branch of industry.

Candle or Taper Match, or Vesta.—This kind of match is prepared by machinery, not unlike a weaver's loom, with its warp ready for weaving. Each wick, composed of untwisted cotton, represents one of the threads of the warp ; and 100 to 200 of these wicks, wound off a cylinder, kept separate by means of combs, are carried through a bath of melted wax. They afterwards pass through small holes in a metal plate, which renders the wax uniform and cylindrical throughout the whole length of the wick. A knife, moved by machinery, cuts all the tapers to a given length, and these slips of waxed threads, fixed in frames, are dipped in the inflammable paste, which contains more chlorate of potash than usual. The subsequent operations are the same as in the case of the wood-matches.

The Fusee for lighting cigars is made from strips of pulp or thin card-board, previously prepared by steeping in nitre, and upon which the maker's name is first stamped.

A girl then takes twenty-five strips in her hand, and with a stick, shaped like a paper-knife, spreads a portion of the red composition over the cut extremities of the upper strip, which is then placed on the table, and so on until the whole are prepared. Another girl receives these strips, and twists them so as to separate the fusees from each other, and arranges them upon a tray, which, when full, is placed on a rack to dry.

The general principle involved in the action of these matches, tapers, and fusees, is, that such substances as phosphorus having a strong affinity for oxygen, are mixed with a large amount of this gas, condensed into a small space, as in nitre or chlorate of potash, so that the slightest cause is sufficient to produce a combination between these elements. Red-lead, and some other metallic oxides mixed with the nitre, act in the same manner when they have once attained a red heat, and thus help to continue the oxydising action commenced by the more easily decomposed nitre at a lower temperature. The smalts, prussian-blue, &c., are added for the purpose of colour, while sand and other similar matters are intended to increase the effects of the friction.

Preparation of the Splints.—We have deferred describing this part of our subject until we had given the above brief account of the various kinds of matches formerly or now in common use.

The wood is previously dried much in the same way as timber is desiccated for ordinary purposes, the air being heated as high as 400°. The best pine-plank, as free from knots as possible, is employed.

Complicated machines have been devised for preparing the splints for the manufacture of the matches, one of which those readers who wish for drawings and more details will find in Armengaud's "Publication Industrielle des Machines Utils et Appareils."

Most of the arrangements include a system of knives or cutting edges, arranged according to the thickness of the splint. In one of these machines the planks are cut across the fibres, by means of a circular saw, into twenty-eight or thirty blocks, each measuring thirty inches long, four and a half inches wide, and three inches thick, which are cut into splints in the following manner:—A frame is attached to the extremity of the horizontal arm of a crank, which gives it a reciprocal motion through a space of about fourteen inches. In this frame are fixed, in a line, some thirty or forty lancets, with the points projecting upwards, and separated from each other by pieces of brass. The block of wood to be cut is inserted by the small end between uprights, and a lever placed upon it, forces it down to such a position that as the lancet-points advance the end of the wooden block is cut or scored in the direction of the fibres with as many lines as there are lancets. As the lancets are withdrawn, by the motion of the crank, a scythe-blade, moving in a horizontal plane, swings round and cuts off the end of the block to the depth of the scores made by the lancets. The pieces thus cut off are four-sided splints. When the horizontal knife swings back, the block from which one layer of splints has thus been removed descends through a space equal to the depth of the section; the lancet-points again advance and recede, and the knife again does its work.

The Boxes.—Manufacturers have also entered into a spirited competition in the character and embellishment of the boxes for containing the matches. Card-board, wood, and metals, all being taxed for this purpose, and every form of device has been adopted to meet the wants of travellers and others, even to making walking-sticks with hollow heads; or, to adopt the language of another, the boxes are cylindrical, vertical, oblong, hexagonal—some open like a pocket-book, some like a telescope, some like a cigar-case, some like a snuff-box; in some a mouse is crouching over a recess containing the matches, while in others General Tom Thumb's head is moveable, and reveals the matches beneath.

The Statistics of the Trade are almost fabulous, when we remember that we can only date its simultaneous introduction into different countries from the year 1834. They were first manufactured on a large scale in Hesse Darmstadt; and the extension was slow and gradual, as some of the other States either controlled or prohibited their introduction, on account of the supposed increased danger from fire; of which Mr. Braidwood, perhaps, will give us some particulars in his next paper before the Society of Arts.

This manufacture has, however, fairly outstripped the measure of ordinary figures, and what follows will convey a faint idea of its magnitude.

In the Report of the Jurors of the Exhibition of 1851 we find it stated, that from 1848 to 1850 the *weight* of matches exported from the Elbe had increased more than *sixfold*, the quantity in the latter year being 1860 cwt.; but we know that at present one importer of matches in London, who does not receive a single case from the Elbe, imports more than four times that quantity, or, on the most moderate computation, 8000 *cwt., equal to* 1000 *tons of shipping* — this article being bulky and light.

In the printed official export list of the city of Hamburgh for 1854, it appears that 9053 cases of matches were exported, of which nearly 3000 came to this country, and the declared value of which was about 20,000*l.* We thus find that this *trifle* figures in the exports of the great free German city to the tune of 50,000*l.*, of which, strange to say, she sent 14,000*l.* worth *to Australia and the Sandwich Islands.* Now, if we allow an increase of one-fourth only on the British imports from the Elbe, we get a sum of

25,000*l.*, while that from the Rhine is certainly not less. To this we must add 10,000*l.* for the present very large imports from Sweden, which then carries our little account for imports of matches into Great Britain up to 60,000*l.* value per annum, and reducing value into quantity, we arrive at the astounding fact that we are buying from our foreign neighbours 200,000,000 *of matches every day.* One is tempted to exclaim, Cannot Mr. Mayhew suggest to his interesting ticket-of-leave friends this field of labour ? and, surely, our ragged-school and workhouse officials ought to go in and possess this land of labour. But to proceed ; our correspondent estimates the comparatively insignificant and little extended home manufacture at 40,000,000 per diem, making the domestic and foreign consumption approach 250,000,000, and assuming none are re-exported, it amounts to more than *eight matches per day per head of the whole population.* This result agrees very nearly with information supplied from Belgium, where the manufacture of matches, and the consumption of materials, is in few hands, and would show a daily consumption of nine matches per head for the entire population.

Our friend, Mr. Albright, says, "It is not easy, in dealing with such numbers, to be sure of being correct; but we estimate that a moderately economical use of the total production of phosphorus would furnish five to six matches per head per diem for the world's population. About ten years ago we recollect being besieged in the streets of Pera (Constantinople) by itinerant vendors thrusting their boxes of matches into our faces; and believing that the *lucifer-match* is one of the first products of manufacturing industry carried by commerce to barbarous lands, we think that five matches a-head per diem for the world's population is much more reasonable than at first sight it appeared even to ourselves."

We have stated that this manufacture is comparatively small in this country; yet, small as it is, the consumption of phosphorus is about eight tons, and of chlorate of potash nearly twenty-six tons — certainly an enormous weight, merely to tip the ends of a match.

We will try to illustrate this trade by what Mr. Dod says of one single saw-mill in London, which cuts up annually 400 large timber trees into splints for matches, which are sold to the makers *by hogsheads.* A consignment to a single Bristol manufacturer on one occasion, consisting of thirty hogsheads, which turned out

15,000 bundles of boxes,
1,080,000 boxes,
54,000,000 matches!

Another gentleman, a few years ago, examined before the Children's Employment Commission, stated that he used 1000*l.* worth of American pine yearly in making boxes, and he estimated the *weekly* production in London at 12,000 to 15,000 *gross of boxes.* Each box contains fifty matches, which would thus raise the annual production of the metropolis to 5,000,000,000 of matches.

The writer of an interesting description of one of the London works tells us, that the waxen-cord cut up yearly into vestas by this single factory would, if undivided, stretch from England to America — *and back again.*

Perhaps the most perfect idea of the extent of this branch of our home manufacture is to be gathered from the account given of Messrs. Dixon's works, at Newton Heath, in the "Daily News." This firm consumes one ton of sulphur per week, and last year worked up between four and five tons of chlorate of potash and twelve tons of glue. Their mill is worked by steam-power and by machines of extraordinary velocity. About three hundred people are employed on the premises ; and as a great quantity of work is sent out to be performed by women and children in their own cottages, probably not fewer than four hundred and fifty to five hundred persons are maintained by work from this firm.

The timber-yard, in which the material is piled up awaiting its turn for the saw, is from two to three acres in extent, and is covered by the huge trunks of American red and white pine, worth on an average, in its various stages, about 10,000*l.* They often purchase 7000*l.* to 8000*l.* worth at a time. Occasionally they send an agent over to Canada or Norway, to buy the wood in the plantations, though generally it serves their purpose quite as well to attend the Liverpool markets, and make their purchases nearer home. Only fancy a maker of matches sending out his agents to foreign countries and distant colonies to examine the living forests, with a view to their being purchased, cut down, sent over to England, and finally converted into lucifers!

This fact, perhaps, conveys a grander idea of the colossal scale on which the Messrs. Dixon manufacture than even the following figures, which are copied from the weekly stock list. The average daily production of the finished article fluctuates between 6,000,000 and 9,000,000. The more certain average of the week is 43,000,000; so that, allowing two full weeks in the year for holidays (and the persons employed in making congreves, or lucifer matches, need all the play-days they are ever likely to get in this country), the produce of the remaining fifty weeks will be no less than the astounding number of 2,160,000,000 matches in the year. Taking the population of these islands at 30,000,000, there are 72 matches for every man, woman, and child; and supposing each match to measure 2¼ inches in length, they would cover the whole surface of an English county; or, laid out longitudinally, would far more than put a circle round about the earth.

We discern, however, some symptoms that we are becoming independent of our foreign friends, especially in the production of the important article of phosphorus; thanks to the skill and enterprise of able manufacturers amongst ourselves, whose operations commenced in 1845—as the following table of imports of phosphorus most clearly shows:—

In 1842	value	imported,	£1162
1843	,,	,,	2370
1844	,,	,,	2567
1845	,,	,,	1499
1846	,,	,,	631
1847	,,	,,	572
1848	,,	,,	180
1849	,,	,,	122
1850	,,	,,	3

It is, however, to the Continent of Europe that we must look for the most surprising illustrations of the extent of the manufacture of this little companion of our civilisation. There it is scattered from the frozen Gulf of Finland to the melting climate of Andalusia, and from the great inland lakes of Sweden to the Carpathians of Transylvania, and the shores of the Bosphorus, from where,—

> "Lapland's founts and lakes arise,"

to the land,—

> "Where the Moorish horn once proudly rung,
> Through the pealing hills of Spain."

It appears to have taken its greatest development in Austria, where two of the leading manufacturers will consume not less than 20 *tons of phosphorus!* and give employment to no less than *six thousand hands.* It forms the most important item of its trade with Chili. We give the *weight* of the export of matches from Trieste in 1849, to illustrate the state of the Mediterranean markets; thus:—

Turkey . . .	took	1226	cwt.
Greece . . .	,,	596	,,
Malta	,,	492	,,
Egypt . . .	,,	382	,,
Ionian Islands .	,,	336	,,
Naples . . .	,,	225	,,
Other countries	,,	530	,,

or, in round numbers, nearly 200 tons; and the entire production of this empire was estimated at 50,000 cwt., of which one-fifth was exported.

The production in France is also on a very large scale: Paris alone employing 1000 work-people; while the annual quantity manufactured is estimated at 990,000,000 boxes of matches, worth 72,000*l*. The quantity of phosphorus made in this country and France may be estimated at no less than 300,000 lbs.

Turning to Sweden, we find one of the numerous manufacturers there, who has recently taken the patent to which allusion has been made, stating:—"This manufactory was established in 1848, and employs at present about 400 workmen. The machines for cutting the matches are moved by a six-horse engine, with a daily production of about 8,000,000 of matches." This quantity has since increased to 10,000,000; and this manufactory is only one of half-a-dozen or more, whose Swedish "Tandstickor" label, and other unpronounceable names, figure on neat little boxes in all the towns of England.

The Cheapness of the Lucifer.—This enormous production, in a great measure, prepares us for some curious facts as to the cheapness of the lucifer. A certain Peter Harass sells his plain boxes at *twopence* per 100, and 1400 splints for *one farthing*. Fürth, in Bohemia, sells his cheapest boxes at *one penny* per dozen, each box containing 80 matches; but De Majo, in Moravia, almost fulfils the ideal of the auctioneer's cheapness, "Less than nothing;"

and would certainly be "King of the fair" on "Penny-packing-day," for he sells a case of 50 boxes, each containing 100 lucifers, for fourpence.

The Disease of the Lucifer. — We now come to an unfortunate attendant of this trade, which attacks the work-people in some manufactories in the form of a frightful disease. It commences with toothache, is followed by decay in the jaw-bones, pieces as large as peas working themselves out, until the lower jaw, in some cases, entirely disappears. We give an account of a young girl of twenty years of age, of pale and scrofulous aspect. She went to work at the lucifer-factory when she was nine years old, and after she had worked for about four years, the complaint began like a toothache. Her teeth had all been sound before that time, at any rate had not troubled her by aching. She was occupied in putting the lids on the boxes. She could smell the phosphorus at first, but soon grew used to it; at night she could see that her clothes were glowing in the chair where she had put them; her hands and arms were also all in a glow. She used to wash her hands, and attend to cleanliness. On uncovering her face, we perceived that her lower jaw was almost entirely wanting, and at the sides of her mouth were two or three large holes. The jaw was removed at the Infirmary seven years ago.

In France, where the consumption of phosphorus is very large, there has been a fearful development of the disease, which has attracted great attention from the Imperial Academy of Medicine, the Conseil d'Hygiène, and Government Commissions; which, it is hoped, will end in the adoption of,—

The Remedy,—In the suppression of the old phosphorus and its substitution by the new kind or amorphous phosphorus, for which some of the leading Paris manufacturers have already presented a petition.

This curious modification of phosphorus was first discovered by Schrötter, of Vienna, who found that if ordinary phosphorus was subjected to a temperature of 480° or 500° for some time, it acquired a red colour, was no longer fusible, volatile, inflammable at low temperatures, nor poisonous. As it may, therefore, be handled without danger, and evolves no fumes in the atmosphere, we believe it offers a certain preventive, and leads us to thank that gracious Providence who has so ordered events that the cure is at hand.

In concluding, we think there can hardly be less than 50,000 persons employed in the manufacture of lucifer-matches, of whom a large number are children and young people, more or less exposed to the inroad of this hideous complaint. However much the evil has been mitigated in this country by the care and precautions of the manufacturers, as well as by the employment of a large proportion of chlorate of potash, there does not appear to exist a doubt in the mind of thoughtful masters of the great benefit which would arise from substituting the amorphous for the old forms of phosphorus. Among many similar testimonies communicated to the patentee of the new phosphorus, we select one from Mr. Hynam, Finsbury, London, who writes, "I am convinced that it will be of great benefit to all the manufacturers as well as the public in general. I should like to see it in general use." And another from Mr. Dixon, the senior partner of the firm at Newton Heath, who says, "There can in our opinion be little doubt but that this material (amorphous phosphorus) is the fore-runner of vast improvements in match-making, not only in reference to the health of those employed in the production of them, but also as regards the offensive effluvia arising from the composition now in use to the general consumer."

To rescue thousands of persons from working in an atmosphere too often absolutely luminous at night with the vapour of phosphorus, and by a change so simple that it will not only involve no additional alterations nor trouble to the manufacturer, but really diminish some present difficulties, is certainly worth an effort on the part of our leading philanthropists.

Nor is this solely a question affecting the health and lives of the workpeople. It is impossible that in every room of our houses, boxes of highly poisonous matches can be left without any precaution, without occasioning fatal accidents. Our coroners' inquests have already recorded the death of children from this cause; and, doubtless, many have perished from similar accidents, without its ever being traced to the true source.*

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* A remarkable case of poisoning was lately detailed in "La Presse," by M. Figuier.—At Cambrin, in the Pas de Calais, two individuals went into a *cabaret*, and asked for a cup of coffee. Scarcely had they swallowed the contents, when they dropped over on one another dead. The woman who kept the *cabaret*, in great excitement, ran and apprised the authorities. Suspicion of having poisoned her guests at once alighted on herself. She protested that they had tasted nothing in her house except coffee, of which there was still some in the coffee-pot on the fire; and to show how good it was she filled a cup for herself, drank it, and soon fell dead beside the two corpses. On examining the coffee-pot, there was found in it a box of lucifer-matches!

The most important medical work on this disease gives us the following melancholy facts, and which loudly call for Government interference:—

"Of 100 workpeople employed in 3 manufactories at Vienna, 22 were attacked by *necrosis of the jaws*. Of 68 cases reported, 15 recovered, 15 died, 15 remained under treatment, and the others are not known.

"In one manufactory at Nuremburg, where 60 or 70 persons were employed, there were 15 cases of disease and 8 deaths!

"There have also been numerous fatal cases in Sweden, France, and England."

While this article is in the press, it has come to our knowledge that in one manufactory, near London, two young men (not of dissolute habits) both died in the course of four or five years, from the effects of their employment in dipping lucifer-matches.

In France, the medical societies have been occupied with this question, on the ground of the cases of murder and suicide in which phosphorus matches have been the agents employed,—an agent the more to be dreaded, because, as they truly state, it is impossible to distinguish it by any chemical test afterwards, from the phosphoric acid and phosphates so generally present in the organs and tissues of the body.

The Academy of Medicine have, in fact, submitted to the French Minister of Commerce, a proposal for the suppression, by authority, of the use of common phosphorus, and for the employment of which, there is now no longer any excuse, since M. Lundström's discovery has been made public. The Jury of the Paris Exhibition have stamped the use of this amorphous phosphorus with their approbation by awarding silver medals to M. Lundström, and M. Camaille, match-manufacturer of Paris, and Mr. A. Albright of Oldbury, the patentee of this article, and the gold medal to the discoverer, Prof. Schrötter of Vienna.

In the hope that this will soon become generally adopted, we think we may fairly claim for *our Lucifer* the character we ascribed to it in our prefatory remarks, while we believe no other invention of modern times has so quickly reached its present state of perfection, nor attained so wide a diffusion among the nations of the earth, carrying its conveniences equally to the poor and the rich.

T. R.

THE HILLS.

UPON the hills, upon the hills!
The ever fresh and free!
To bound along with the living breeze
That blows so joyously!
What a thrill of youthful vigour
Its magic breathings give!
In life's thronged vale I do but move,
Upon the hills I *live*.

Oh! for a painter's hand
To catch the gloom or glow,
Which sun and shade alternately
O'er the boundless prospect throw!
The dark-brown heath, the glistening fern,
The whortle's golden green,—
The aged thorn, the copsewood oak,
And the lights that shoot between,—

The tricolor polygala
That springs beneath my feet,—
And the golden-vested tormentil
That spangles the turf so sweet;—
My earliest childhood loved
To gather these fair flowers,
And I love them still for their own sweet selves,
And the memory of past hours.

Upon the hills, the mighty hills,
On every side that rise;
Their bases in the ocean,
Their summits in the skies!

Symbols of power majestic,—
  Relics of ancient Time,—
With each ascending footstep
  My spirit seems to climb!

And must I quit your freedom,
  And fettered toil again
Amid the dull routine of life,
  The crowded haunts of men?
Yes, Life is not for rapture,
  But for willing self-denial,—
For Faith and Love and Righteousness,
  Still perfected by trial.

Then onward! in well-doing
  Tread selfish visions down;
Not indolent emotion,
  But patience wins the crown.
And when wearied in life's battle,
  Let the thought of hours like these
Refresh thy fainting spirit
  As the fanning of the breeze.

But chiefest onward, upward,
  Be fixed thine earnest sight,
Where rise the Everlasting Hills—
  Where spreads the Infinite!
Upon that new creation,
  Where the pure in heart shall see
That Goodness perfected is Bliss,
  And Truth is Liberty.

H. S. E.

The Quantocks, June 26, 1856.

NUTRITION (*continued*).

No part of the intestinal canal lies quite free and disengaged in the cavity of the abdomen. The whole of it is fastened by suitable folds of the lining membrane, which prevent implication and injury. One of these folds, fan-shaped, is called the *Mesentery*. To its outer edge the small intestines are attached, like the hem on a frill. Its inner edge is fixed to the backbone. In this way their integrity is secured from any, but extreme, violence, and yet no hindrance or restraint is offered to a vermicular movement of the canal termed the *Peristaltic action*, by which the food, during its various stages of change, is steadily and regularly moved onwards. Between the membranous layers, of which the mesentery is formed, the arteries and veins pass which supply the intestines with blood, the intestinal-nerves, and a set of delicate tubes called *Lacteals*, among which are distributed, pretty numerously, the *Mesenteric* glands.

The Lacteals form part of an important system of vessels, known under the general term of *Absorbents*, which are found in almost every part of the body, excepting the brain. With them the reader is presently to be made acquainted.

Before adverting to them, however, more particularly, it is necessary to notice the *Liver*, as that is next in succession in the order of digestive organs. This large gland—the largest in the human fabric—occupies the upper part of the cavity of the abdomen, on the right side, under the ribs, where it is suspended and retained by several strong ligaments. In adults its weight varies from two to five pounds. It is unsymmetrical in shape, of a brownish-red colour, compact, but not firm, and, on this account, is easily torn. It furnishes the *Bile*. Notwithstanding the pains taken by anatomists and microscopical observers, its intimate structure is still unknown.

Attached to the under surface of the Liver is a small pyriform reservoir, called the *Gall-bladder*,* which receives and retains a certain portion of the bile for occasional use.

Both the quantity and quality of the bile differ a good deal in different persons; and in the same person under different circumstances. It varies with climate, season of the year, and from temperature alone, and during every day, with reference to the taking of food. The largest quantity appears to be poured out from about twelve to thirteen hours after eating. In a healthy adult, the quantity furnished, in twenty-four hours, ranges from seventeen to thirty ounces. Berzelius says:—

1000 parts consist of	water	907·4
,,	biliary matter..	80·0
,,	mucus	3·0
,,	alkalies, especially soda..	9·6
		1000·0

He and Liebig differ a good deal about the chemical state in which these ingredients exist.

Another of the viscera, auxiliary to the function of digestion, is the *Pancreas*, which lies behind the stomach, and across the spinal column. It is about six inches long, and from two to three inches broad. In structure, and function too, it is almost identical with the salivary glands. Like them it pours out a large quantity of fluid during the process of intestinal digestion. The duct, which conveys the *pancreatic juice* into the intestines, enters, like the bile-duct, in a slanting direction, and terminates, close by it, in the duodenum; the first portion of the intestines, not far from its junction with the stomach.

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* Not unfrequently, and *probably in consequence of insufficient exercise*, depositions from the bile occur in this receptacle, and gall-stones are formed. Mr. Abernethy used to mention, in his lectures, that he had found more than 1500, of different sizes, in one gall-bladder.

To the upper part of the abdominal cavity, on the left side, opposite to the liver, and contiguous to the stomach, the *Spleen* is attached. It is a sponge-like viscus of a blueish, almost livid, colour, and seems to consist of a congeries of blood-vessels enveloped in a membranous covering. Its use is not known. Animals bear its removal without seeming injury. The most probable conjecture affixes it as directly subordinate to the stomach. When that is full, the spleen becomes compressed and emptied; when the stomach is lax and empty, it becomes turgid and distended with blood.

The reader has now been made acquainted with the names, at least, of the different organs engaged in the process of digestion. A detail of the experiments and suggestions, reasonable and unreasonable, which have been made to explain the process, would almost furnish a series like the Thousand and One tales in the "Arabian Nights;" some amusing, some clever, and some stupid.

Accident, experiment, observation, and the investigations of comparative physiologists, have enabled us to trace the successive changes which the food undergoes; to ascertain in some degree the part which each organ fulfils, and to note the stages at which each change takes place. But the chemistry of life is so very subtle; we are so imperfectly acquainted with its refined and complex transactions; and so ignorant both of the nature and amount of that vital influence* which directs and modifies its agency, that, of any clear and satisfactory explanation of the true and intimate nature of the process, we are still destitute.

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* Dr. Haighton divided, in a dog, the eighth pair of nerves: those with which the stomach is chiefly supplied. The dog continued to take his food as well as before, but showed manifest signs of sickness and disquietude. He wasted and became almost a skeleton. After a time (as it seemed, in consequence of the nerves becoming united), he improved in health, digested his food, recovered his flesh, and got quite well again.

Soon after its reception into the stomach, the food begins to be changed. Its different ingredients lose their special qualities; become defended from the ordinary changes, such as putrescence, fermentation, and rancidity, to which they are otherwise liable, and are gradually converted into a soft pulpy mass, technically called *Chyme.* This conversion is chiefly, if not entirely, due to the *Gastric juice,** which exudes through numberless pores on the inner surface of the stomach. The chemical qualities of this remarkable fluid, in as far as they are comparable with those of other resolvents, throw no light on its singular powers. It is slightly acid; and beyond that little is known respecting it.

The power which the gastric juice possesses of reducing the food into pulp, is curiously limited, by the nature of the food on which any particular species of animal naturally feeds. Spallanzani found, in very numerous and often-

* Much importance used to be attached to the high temperature maintained in and about the stomach, and neighbouring viscera, by the large quantity of blood in their blood-vessels; and hence, the term coction was, at one time, synonymous with digestion. The peristaltic action of the stomach itself, and the alternating movements occasioned by respiration, &c., were also thought to render important assistance. But it does not appear that either of these are accessory circumstances. Animals having cold blood, digest often faster than the warm-blooded;* and the experiments of Dr. Stevens, made by introducing into the stomach hollow perforated silver balls, enclosing different articles of food, pretty satisfactorily show that mechanical force, of any kind, has little or nothing to do with the process.

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* A *due* degree of temperature, however, facilitates even artificial digestion. It has been found that in a constant heat of from 96 to 105°, the resolution of many substances goes on most readily.

repeated experiments, that, if taken from the stomach and put into glass vessels, it produced, when kept at the usual temperature of the animal, changes in all respects like those which occur in natural digestion. What was taken from animals which fed only on flesh, dissolved only animal substances, leaving vegetable matters untouched; while that which was taken from herbivorous feeders acted on grass and vegetable substances, without producing any effect on flesh; and if taken from those which, like men, are omnivorous, it seemed to act with equal vigour on both sorts.

The alteration which the food undergoes does not proceed equally through its whole mass at the same time, but takes place chiefly, and at first, on that part which lies in immediate contact with the stomach. This portion being subdued, is passed on into the intestines, without being detained until the whole is changed.

There is a good deal of difficulty in determining the length of time required for digestion, not only in different persons, but in the same person in different conditions. Some circumstances hinder, some hasten it. It varies with the quality and quantity of the food; with the amount of its previous mastication; the age of the person; the state and strength of the digestive powers, and in some degree, with the immediate requirements of the system. We may state, however, generally, that the chyme passes the pylorus between three and six hours after a meal. Such portions of the food as are not properly subdued, on becoming presented at the pylorus, are repelled back by a reverted, or anti-peristaltic movement of the stomach, to undergo a still farther and more complete resolution.

After passing through the pylorus into the duodenum, the chyme becomes diluted with the pancreatic juice, which is poured into the intestines through an orifice common to it and to the bile. Besides diluting the mass, the pancreatic juice is thought to have a good deal of influence in forwarding its decomposition.

Though the constituents of the bile have been ascertained with considerable accuracy, its chemical action is still obscure. Little by little as it becomes mixed with the chyme, it appears to educe from it a thin milk-like fluid, termed *Chyle;* and to precipitate the feculent parts, which pass on into the large intestines for subsequent detrusion. The chyle is an epitome of our food. P. S.

DIVINE THOUGHTS *IN* THE FACTS OF CREATION.

No. I.

THE Universe is a thought, embodied in a fact,—a grand thought, embodied in a mysterious and overwhelming fact. We propose to reverse the process of which Creation is the mighty result, and to *re*-solve outward phenomena into the underlying ideas of which they are the significant symbols. In a true scientific spirit, without at all pretending to a rigorous scientific method, or to the minuteness and fulness of scientific detail, we shall survey some portions of the wide domain of physical inquiry, in order to show that we are encompassed on every side, not more truly with objects for the senses, than with ideas for the intellect.

THE SPHERE OF ASTRONOMY,

to which we turn first of all, offers striking illustrations of embodied Divine thought. In this sphere, there are before us, 1. Our own Planet; 2. Our Planetary System; and 3. The vast concave of Stars.

The Earth's nearly circular form, its inclined position, its daily revolution on its own axis, and its annual wandering around the central sun, comprise the leading facts of its planetic constitution. Two, only two, of the ideas which are uttered articulately in these facts, we shall take forth; these are, the fitting and wise distribution of light, and the fitting and wise distribution of heat.

First.—The Divine Idea in the peculiar constitution of our planet, is, a fitting and wise *distribution of light.*

The sun is the fountain of light, the sole fountain, to our earth. Between the source and the object on which the supply is to descend, there intervenes the terrestrial atmosphere. The refracting power of this medium need not here be named; but one of the patent and essential uses of the atmosphere is to act as a conductor and reflector of light.

The form of the earth necessitates that only one side, larger or smaller, of the sphere, can be presented to the rays of the sun at a time, the other side being in darkness. The diurnal motion of the earth on its own axis is every moment withdrawing one portion of its surface from the sun and presenting another to his rays. If the relative position of the earth to the sun were always the same—if the sun's light fell always perpendicularly on the equator, days and nights all over the world would be equal, and always one equal half of the globe would be in light, and the other in darkness. But the inclination of the earth's axis, together with its spherical form, causes that, in its annual circuit around the sun, different portions of its surface are at different times presented to the light. At one period of the year, the direct light falls day after day on a part of the surface farther and farther north of the equator, and in the northern hemisphere the days are proportionally and increasingly lengthened. Having reached its farthest northern limit, the direct light declines successively, the days proportionally shortening, till again it falls perpendicularly on the equator, and days and nights are equal. An exactly opposite course then commences. The direct light falls on a part of the surface farther and farther south, the days in the southern hemisphere lengthening, while those in the northern hemisphere increasingly shorten. Having reached its farthest southern limit, the direct light again successively declines till it once more reaches the equator. The facts now named, which readily explain the unequal length of days and nights throughout the year, also account for a distribution of light peculiar to the Polar regions of the globe. When the sun is in the southern hemisphere, as we speak, the northern polar regions, in consequence of the inclination of the earth's axis, can receive no portion of his light, while to the southern he never entirely disappears. The one enjoy a day extending over nearly half the year, and the other endure a night equally extended. In the same way, when the sun is in the northern hemisphere, the northern polar regions have their six-months day and the southern their six-months night. But this remarkable peculiarity occurs in quarters of the globe, which from other causes are nearly uninhabitable. The northern polar regions have but a scattered and scanty population, and the southern show only a wide wild waste of waters.

Over the *habitable* globe, there prevails the beautiful and beneficent economy of successive day and night. What is beautiful in the arrangement need not be dwelt upon, but its adaptation must not be overlooked. It is, indeed, the necessary effect of the laws of the planetary system; and unless our globe had been an exception in its form and in its movements to all the other spheres, it could not have been otherwise. But we mark, nevertheless, how strikingly the arrangements of the earth as a planet are adapted to the constitution of its organic inhabitants. If *it* was not made for them, *they* at least have been made for it. The effect of the planetic laws of our globe being what we have marked, we find that only such vegetables and animals exist on it as need the daily alternations of light and darkness, as are invigorated and refreshed by them, and indeed could not survive in their absence. All things grow and thrive in light, and yet need the rest of darkness. The mighty stars, indeed, the sun and the globes that wheel around him, know no night, no pause from labour, and even on the earth itself the processes of organic life go forward without intermission. But for man and for beast, for all orders of terrestrial animals, and not less for the vegetable creation, the interval of repose and quiet is essential. They sleep, that they may wake up refreshed and braced for new efforts. Tired nature seeks a kindly and restorative influence, and the sun withdraws for a time, that the influence may be enjoyed with every advantage. There is, in short, an idea underlying the outward phenomena—an idea not more profound than beneficent.

Besides the direct supply of light from the sun, our earth receives his reflected radiance through the medium of her faithful satellite, when the great luminary himself has sunk in the west. The monthly pilgrimage of the moon around the earth is familiar. The cause also of her changing phases, as she now waxes and now wanes, is hardly less familiar. When our earth comes between the sun and the moon, the movement of the moon not being exactly in the plane of the earth's motion, the sun's light falls directly on the satellite, and we behold her full lighted hemisphere. As the moon pursues her course nearer and nearer the sun, a larger and still larger portion, successively, of the lighted circle, is turned from us, and a larger and still larger portion of the unilluminated circle is turned towards us. We see half, then a quarter only, till the moon coming between us and the sun, the lighted circle is entirely towards the sun, and only the unilluminated is towards us. As the moon, however, pursues her course from the sun, a larger and still larger portion, successively, of the lighted circle is turned to us. We see a quarter, then a half, till again the earth is between the sun and the moon, and we behold her entire hemisphere lighted up. It would be presumptuous to imagine that we know all the uses in the economy of the universe, or even in relation to our earth, which the moon is designed to serve. One thing seems certain, from the decisive fact that no atmosphere exists around this orb—not to name other confirmatory circumstances—that it cannot be the habitation of organised beings. Its functions, in reference to our earth, are imperfectly understood. Its effect on the movement of the ocean, indeed, has long been known; the tides of all seas are found to rise as the moon reaches the meridian, visible and invisible to us; that is, every twelve hours. What influence it may exert on weather, on climate, on the seasons, and on the fertility of the earth, is wholly unknown: but its effect in modifying the darkness of the night is palpable as it is delightful. To all seeming, this is the principal end which it serves, and the idea is confirmed by the analogy of the other planets; for according to their distance from the sun, they, too, are furnished with numerous satellites. The thought—the divine thought—is to minister not to the necessities only, but to the convenience and enjoyment of the world's inhabitants. A bountiful Wisdom grudges not an express provision for tempering the necessary effect of the earth's rotation. QUÆRENS.

LIFE, IN ITS HIGHER FORMS.

No. IV.

BIRDS.

EVERYBODY loves Birds. The pinafored schoolboy dares the awful frown of the pedagogue, and his birch too, that he may peer into the brambles and hedgerow-trees, for the callow young which he desires to rear. The fair maiden teaches her pet canary to hop on her finger and take his sugar from her own sweet lips, bestowing on him the kisses which many a bigger biped would be proud to share. The solitary weaver, grey with premature age induced by ceaseless toil, hangs his thrush in wicker outside his shattered casement, and throws his shuttle more blithely as he listens to the mellow notes which carry him back to the fields and groves of his boyhood. The weather-beaten sailor greets the little land-bird with a hearty welcome, that flutters on feeble wing around his ship, clinging to the shrouds and stays, and loves the tiny messenger that tells him of his approach to his native shore. The world's care must have indurated that heart, indeed, that can hear without a gush of emotion the sweet melody of a singing bird!

We must not, however, just now consider the Bird as a loveable little pet, but look at it physiologically as an animal;—as one of the meshes in the grand net-work of organic existence. We call it a biped, but structurally a bird is a quadruped. Look at a plucked pigeon, and see how it differs in the matter of limbs from a skinned rabbit, except that the fore legs have no feet or toes at their tips. After all, the pensioner's child who respectfully submitted that "mother didn't like always to have the *hind leg* of the chicken," was not so far wrong. The bird is, in fact, a quadruped adapted for flight. To this end the fore limbs are greatly lengthened and strengthened, as to them is assigned the office of beating the air by successive strokes, and thus impelling the body through that fluid, as a boat is rowed by oars. Flying, like swimming, is but rowing *through* the medium, instead of *on its surface.*

In order to make these limbs effective, to render them capable of long-sustained energetic action, they must be moved by stout, dense, and powerful muscles. Every one knows that the most fleshy part of a bird,—and especially of a flying bird, such as a pigeon, as distinguished from a running one, such as a fowl,—is the mass that lies on the breast-bone. Now this mass of flesh, or rather these masses, one on each side, are the great pectoral muscles, one end of which is inserted on the broad surface of the breast-bone, and the other end is spread along the bone of the shoulder or upper-arm. For the attachment of these great muscles, there must be a great breadth of surface; and see how skilfully this is provided in the form of the breast-bone! It is a firm buckler of great width planted across the viscera, while, as even this extent would not have been sufficient, the surface is greatly increased by a high keel or ridge of bone that rises from its centre, to each side of which the muscles are attached.

But the stroke made by such a limb, however muscular, upon the air, would be comparatively powerless as a means of locomotion, if that limb were in the condition which it presents when the cook puts the bird on the spit. The breadth of the oar and its hold upon the element through which it is to move are, therefore, increased by a most admirable contrivance. The *quill-feathers,* inserted along one edge of the arm, and radiating outwards and backwards, like a fan, answer the purpose proposed. Just look at the quill-feather from a bird's wing. With how small an expenditure of material is a broad surface obtained! How slight and apparently feeble is the structure, when examined fibre by fibre; and yet how firmly and compactly it binds together, and how strongly the expanded web resists the air! Breadth, strength, and lightness, were the requisites, and, incompatible as they might have appeared, they are here exquisitely combined.

Even such instruments as these, however, would not avail to lift the animal from the earth, and to bear it with ease and rapidity through the thin air, were its body of the same density as that of a quadruped. It must, therefore, be made buoyant, and this buoyancy is secured by several concurrent ordinances. In the first place, the whole of the muscles are abundantly supplied with blood, which passes through a heart of four chambers, with a rapidity far greater than that which obtains in terrestrial animals. Secondly, to supply the oxygen which is required for the vitalising of this swiftly circulating blood, a peculiar system of respiration is required. The lungs are very large,—spongy masses of blood-vessels lying along each side of the back-bone, and bound down to it: through these the *bronchi*, or divisions of the windpipe, pass; and opening into the general cavity of the chest, admit the air freely into every part of the interior: nay, more; the atmospheric air bathes every blood-vessel of any considerable size throughout the body, passes into the hollow bones of the limbs, and even penetrates between the muscles, and into great membranous cells beneath the skin.*

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* This peculiarity was once brought strongly under our own observation in the case of a pelican (*Pelecanus fuscus*), which we were dissecting. The whole inner surface of the skin on the trunk was cellular, especially on the breast, forming an immense congeries of membranous bladders,

The consequence of this copious supply of oxygen to the blood, not only in the lungs, but in every part of its course, is a great increase of its heat, which far exceeds that of the most warm-blooded quadruped. The heat pervading the whole of the animal tissues is communicated to the air, which, as we have just seen, is so extensively distributed about the body; and thus the bird is not only rendered light by being blown out with air, but that air is brought up to a very high temperature, and so rarefied, and made very buoyant.

The animal heat thus generated must not be allowed to escape too rapidly; and hence a body-clothing is provided, which of all substances is perhaps the most effective non-conductor of caloric. A feather is in itself a study. When we look at the whole covering of a bird, we cannot help observing how soft, how light, how smooth, how compact, how warm it is; and if we examine each feather separately, there is not less to admire in the details of its structure. It consists of two parts; a light but firm *shaft* formed of a pithy substance, hollowed at the lower end into a horny tube, containing the blood-vessels by which it is sustained; and the *vane*, a double series of parallel thin plates, one on each side the shaft, set at an angle to it, which are themselves furnished at their edges with a similar though smaller series. In all feathers which are destined to strike the air, these branchlets are hooked into one another, so as to present a continuous surface of astonishing firmness.

The relation which the general clothing-plumage of the body bears to flight,—though less direct and obvious than

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inflated with air. As an example of the free intercommunication that exists between the tissues of the body, it may be mentioned that, in this specimen, the great gular pouch, when filled with water (to the amount of seventeen pints), allowed it to escape by dripping from a wound in the *outer joint of the wing*.

that of the quills,—is by no means small. "From the mode in which the feathers, and all their parts, are laid upon the bird, it presents a smooth surface upwards and forwards, so that the animal can move in either of these directions, with very little resistance from the friction of the air. When it moves in either of them, the resistance of friction does not increase so rapidly as the rate of motion; because the pressure smooths the feathers, and causes the air to take less hold on them. This property, which arises in part from the texture of the upper surface of the feathers, but chiefly from the way in which they are formed and placed, is of equal service to birds when they must perch, or otherwise remain at rest, so as to abide the blast, as when they fly exposed to it. Perching or flying, when a bird is in the wind it always faces the current; and thus offers the least resistance both by its form and its feathers.

"When, however, the feathers are taken in the opposite directions, they offer as much increase of resistance as they offer diminution when they are taken above or in front. The wings are always more or less hollow on the under sides, and they take hold of the air by millions of fibres; so that a bird, with its flying feathers on the stretch, would fall much more slowly than one would suppose from the difference between its specific gravity and that of the air.

"The resistance which all the feathers on the body of the bird offer to motion backwards is still greater; and it increases with the force which tends to move the animal in that direction. The instant that it begins to be driven backwards, so that a current against its body is produced, the points of the feathers rise, and take the wind with so many fibres, that the resistance is very similar to that made by a scaly fish, when one attempts to draw one of these by the tail; and every one who has angled, and accidentally caught even a common trout in that way, knows that an ounce weight is as difficult to land when so hooked as a pound weight is when hooked by the head. But the feathers of birds rise much more in proportion than the free edges of the scales upon any fish; and they are every way as well formed for *holding on* in the air, as those are for holding on in the water. Thus the bird may be said to resist motion backwards in the air, by throwing out the point of each feather like the fluke of an anchor."*

The jaws of a Bird are not furnished with teeth, as are those of a Fish, an Amphibian, a Reptile, or a Mammal, for the purpose of seizing, dividing, or chewing the food. The place of these organs is effectually supplied by a casing of horn, terminating in a point at the tip, and brought to an edge on each side of each jaw. This modification is familiarly known to us as the *beak* or *bill* of the Bird. In the Birds of prey, the beak is a keen carving-knife; the Peregrine Falcon is said to pluck, to disjoint, and to carve its prey with as clean a cut and as prompt a skill as the most accomplished "table-anatomist" could display. In the Woodpeckers, which dig out their food and excavate their dwellings from the solid timber of trees, the beak is an effective chisel. In the Snipe and Woodcock it is a long and slender probe, furnished at the tip with copious nerves of sensation, for feeling in the deep earth of bogs and marshes. In the Parrots it is a climbing hook, a sort of third foot (or rather hand) as well as a fruit-knife. In the Ducks it is a pair of flat spoons, for scooping up the slush of ponds; and in the Gannet it is a strong and sharp fish-spear.

Versatile as is the beak in different tribes of birds, it nowhere performs a proper masticating function; it may divide flesh; it may crack a nut, and, with the assistance of the tongue, shell it; it may separate the grain from the husk, as we see the Goldfinch and Canary constantly do with their hempseed; but the nearest approach to a chewing action that we at this moment recollect is, the bruising down of hard seeds by means of a knob in the middle of the palate, as in the Buntings (*Emberizadæ*). The consequence of this general absence of masticating power is that the food is swallowed entire. When the food is flesh, the process of digestion is sufficiently simple and rapid to need no preparation; but in the case of the hard grains and seeds that constitute the staple diet of so large a number of species, a peculiar provision is requisite for grinding,—a sort of internal mill.

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* Mudie's "Nat. Hist. of Birds," 37.

This organ, well known as the *gizzard*, is endowed with immense power for grinding and crushing; it is almost wholly made up of two semi-globular masses of dense muscle, the two opposing faces of which are coated with a layer of thick leathery skin. Between these the vegetable substances to be ground are dropped from the crop, just as the corn is dropped from the hopper between the millstones; and the force exerted when these faces work on each other is immense, and all but irresistible. The facility with which substances the most hard, angular, and even acute, are ground down, and that with perfect impunity to the coats of the gizzard, is proved by the researches of Plater, Réaumur, Redi, and Spallanzani. The experiments of the last-named philosopher possess the highest interest: he introduced tin tubes variously strengthened with wire, into the stomachs of turkeys, and invariably found them crushed, flattened, broken, and variously distorted. Thick balls of glass were broken, ground down, and in a few hours completely pulverised. Pieces of glass, with sharp, jagged edges, shared the same fate, without in the least wounding the callous skin of the gizzard. Needles were cast into a ball of lead, so that their points projected a quarter of an inch, and being encased in a soft substance, were thrust down the throat of a turkey; in twenty-four hours the points were broken off close or rubbed down, and the gizzard uninjured. "Finally," says Spallanzani, "I fixed twelve small lancets, very sharp both at the points and edges, in a similar ball of lead. They were such as I use for the dissection of small animals. The ball was given to a turkey-cock, and left eighteen hours in the stomach; at the expiration of which time that organ was opened, but nothing appeared except the naked ball, the twelve lancets having been broken to pieces. I discovered three in the large intestines, pointless and mixed with the other contents; the other nine were missing and had probably been voided. The stomach was *as sound and entire* as that which had received the needles.

"Two capons, of which one was subjected to the experiment with the needles, and the other with the lancets, sustained them equally well. My next wish was to know how much time elapsed before the beginning of the fractures; and by repeated experiments on turkeys, I found that these sharp bodies begin to be broken and lose their shape in two hours. This at least happened in two individuals of the species: in one, four of the lancets, and in the other, three of the needles, were broken within that space; the others were blunted, but continued fixed in the balls."*

Turning from these experiments, which, however important in a physiological view, certainly have an appearance of cruelty, let us for a moment glance at Birds in a more inviting aspect, as the songsters of the groves,—the myriad performers in the sweet orchestra, whose notes thrill our ears and hearts, in those spring mornings that are so delightful, when the freshness and loveliness of nature is like the opening of the gate of Eden. Nor less in balmy summer nights, when the Dipper, the Sedge-warbler, and above all, the Nightingale, are awake, and pouring forth rich and solemn melody. "He that at midnight," says Izaak Walton, "when the very labourer sleeps securely, should hear, as I have very often, the clear airs, the sweet descants, the natural rising and falling, the doubling and redoubling of her voice, might well be lifted up above earthe, and say, Lord, what musicke hast thou provided for thy saints in heaven, when thou affordest bad men such musicke upon earthe!"

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* "Dissertations," i. 19.

One might make a volume with extracts from the poets in honour of the Nightingale,—from Homer, who fancies her wailing and mourning her woes, down to Coleridge, who considers it high treason against common sense to suppose there is anything melancholy in nature.

"We have learned
A different lore: we may not thus profane
Nature's sweet voices, always full of love
And joyance! 'Tis the *merry* nightingale,
That crowds, and hurries, and precipitates
With fast, thick warble his delicious notes,
As he were fearful that an April night
Would be too short for him to utter forth
His love-chaunt, and disburthen his full soul
Of all its music! . . . .
. . . . . Far and near,
In wood and thicket, over the wide grove,
They answer and provoke each other's songs,
With skirmish and capricious passagings,
And murmurs musical, and swift *jug, jug;*
And one low, piping sound more sweet than all,
Stirring the air with such an harmony,
That should you close your eyes, you might almost
Forget it was not day."

The Mocking-bird (*Orpheus polyglottus*) of the Western World, rivals the Nightingale in the compass, mellowness, and brilliant execution of its song, which *it* also delights to trill forth on moonlight nights, making the woods to ring again. We have listened enraptured to the united melody of dozens of these birds together, in the orange-groves of Jamaica, during those beautiful nights when a tropical moon looks down from the vertical sky in dazzling lustre, when the air is cooled by the fresh land-breeze from the mountains, and thousands of fire-flies are sailing in and out at the dark edges of the woods, like living sparks of fire. Then the birds, each taking his stand on the topmost twig of an orange or lime-tree, pour forth, one after another, their gushing songs, now one answering his fellow, now all singing together as if eager to drown each other's voice; now one alone is heard for a few moments, then the others rush anew into the contest, which is often maintained till after midnight.

The song of Birds is closely connected with the reproduction of the race. There are a few species, it is true, as the Redbreast, that protract their melody into autumn, and even into winter; but the grand chorus of the woods and fields comes in and goes out with spring. It is the male, almost exclusively, that is the performer; he begins to sing his love-song as he woos his mate, while the hedges are yet leafless; he sings blithely in the intervals of his labour, as he assists to build the nest; and he sings almost without intermission from morning to night, to cheer his spouse in her patient duty of incubation. As soon as the parental duties cease, we hear little more of "the voice of the bird."

And thus we are introduced to that miracle of instinct, the Bird's nest; which must, however, be the special subject of another paper.

P. H. G.

TERRESTRIAL MAGNETISM.

When we become familiar with any phenomenon we are disposed to neglect all consideration of the causes by which it is brought about or continued. The mariner's compass is a thing of ancient date; it was the indicator to the early navigator of the Indian Seas, the guide to Columbus across the wide Atlantic, in his perilous voyage from the Old to the New World, and it is the aid by which every modern seaman steers his course to the most distant shores.

We look at the compass-needle pointing ever towards the mysterious north, yet how few are those who ask themselves, why that bar of steel has this singular constancy of direction? The answer, too, which is usually given, when the question is asked, is to the effect that there is at the poles of the earth some peculiar *attractive* power which *draws* the needle towards it. When the simple experiment of attracting iron-filings by a magnetised bar of steel—a magnet—is made, this theory—of soliciting north and south poles—appears to be confirmed. Yet there is no evidence of the existence of any magnetic masses near the axis of our planet, and the remarkable fact that the spot towards which the compass-needle points is constantly varying, shows that this attraction cannot be due to this cause.

Let us examine briefly the phenomena of terrestrial magnetism, as indicated by a small magnetised bar of steel, so suspended that it is free to move in *any direction.*

It is necessary that we suppose ourselves at the equator. There, and nowhere else upon the surface of the earth, will our needle maintain a perfectly horizontal position. If we now advance, towards either pole, we shall find that the magnetised bar declines at that end which points to the pole towards which we are approaching. We will imagine that we are passing northward, and observing this phenomenon, which was first noticed by Columbus. It will be found that the *dip of the needle* steadily increases until in the latitude of Paris the *inclination* is 69° 12′, and at London 69° 57′; and in the highest northern latitude which has been reached it is 89° 59′, or nearly vertical. The *dip* at any particular place is subject to regular variations within small limits, showing some regular movement in the force, which we call Magnetism.

Again, the point to which the north-pole (so called) of a compass-needle is directed, is not the true pole of the earth, but the magnetic pole, a point which is now situated about 25° west of the true north. This point is also subject to constant change. From the year 1657 to 1662 the magnetic pole and the polar axis of the earth coincided ; and we learn that in 1580 it was 11° 17′ eastward of the true pole. Since that time the magnetic pole was steadily moving westerly, until it arrived at its maximum variation in 1815, and it is now as steadily returning again. These movements of the force prove that the phenomena of the compass-needle are not due to any fixed centre of magnetic attraction.* The question naturally arises, To what, then, is this magnetic attraction due ? Fortunately, the advance of knowledge enables us to give an answer, which indicates many of the conditions to which terrestrial magnetism is due, and opens out to us a new train of inquiry which is of the most wonder-awaking character.

Oersted, of Copenhagen, was the first who observed that a magnetised bar, being suspended over, and *in the same direction* as a stretched copper-wire, moved in a remarkable manner, when an electric current was made to pass through the wire. Whenever the wire, by contact with the voltaic battery, was brought into an electrical condition, the magnetic-needle moved, and eventually came to rest, at right-angles to the wire. Thus was established the law that magnetic force is always exerted at right-angles to electrical force. If around a bar of soft iron, possessing no magnetic character, some copper-wire is coiled, and this wire is connected with a voltaic battery, the bar—so long as the electrical current circulates through the wire—becomes a powerful magnet, capable of exerting very strongly the polar forces of *attraction* and *repulsion*. To render the law clear, let us describe another experiment: A large bar of steel, rendered magnetic, is placed upon a table, and a copper-wire is suspended above it, so that it hangs in the direction of its length, and by some simple arrangement, which does not interfere with its freedom of motion, we have the power of making an electric current circulate through the wire. Now, as the magnet is fixed, and the wire free, the latter moves and arranges itself at right-angles to the former. *Electrical force and magnetic force are exerted at right angles to each other.* The application of this law to the grand phenomena of terrestrial magnetism must be shown.

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* The term *attraction*, so commonly used, is here employed to express the *pointing* of the needle without intending to imply any drawing power.

Every traveller by railway is now familiar with the lines of wire which run along by the sides of the iron roads. The express trains rush onward with a bird-like speed, but the intelligence of their flight is communicated from station to station in less time than the driving-wheel of the engine can make one revolution. Lines of such wires now pass from London to St. Petersburg ; and the governments of these two powers, which were waging deadly war, are now exchanging messages of peace, and the electricity which carries the thought expressed in London tells it in St. Petersburg in ***one second of time*** from its departure.

Those wires, running east and west over the earth's surface, have brought us acquainted with a fact, suspected before, but which remained until recently only an ingenious and probable theory.

It should be explained that many of those wires are, for special purposes, connected with the earth, by sinking into the soil what is called an ***earth-plate.*** If any electrical disturbance takes place in the earth it is communicated along the wire, and indicates itself by disturbing the telegraphic needle at a distant station.

Zantedeschi and Barlow, by carefully observing the phenomena, have proved that as the earth, in its diurnal rotation, advances to meet the sun, there is generated from each point upon which the sun's rays fall, a current of electricity, which circulates towards the west. These electrical currents thus excited by solar power—probably by solar heat—are constantly circulating around the earth, from the east towards the west. They may be imitated, by placing copper-wires upon an ordinary globe along the lines of latitude. If we hang up a compass-needle above our experimental-globe it will swing at right-angles to these wires, or in a direction corresponding with the lines of longitude. So above the natural globe the magnetic bar is compelled to point north and south, in obedience to the law which has been indicated.

The solar rays falling on the earth's surface in the morning awaken a dormant power, which sends its delicate pulsations westward from that locality. The myth of the harp of Memnon, bursting into sound at the touch of the morning rays, would appear to be the outshadowing of a great philosophic truth. Undulations of a mysterious kind —ELECTRICITY—are generated by solar agency, and circulating according to the law fixed by the Almighty Creator of all things, they develope a modified form of this force in a contrary direction—MAGNETISM—which is so all-important to the ocean-voyager.

The researches which have been made by order of all the great governments of Europe within the last few years have brought us acquainted with some other truths, showing us that "this low earth of ours" is ever, for its ordinary phenomena, dependent upon the exertions of force taking place at millions of miles from us.

Spots on the sun may almost always be observed by looking at that orb through a smoked glass. Galileo was the first who made any especial observations on them. Scheiner and Mayer examined them carefully. Dr. Wilson promulgated, in 1774, a theory of their formation. Sir William Herschel observed those spots in their progress of creation and decay; and Bode and others have framed ingenious hypotheses to explain these remarkable phenomena. We may probably, on some future occasion, devote a paper to the physical condition of the sun's surface. These spots, which are now proved to be enormous openings, produced by a vorticose action in the gaseous envelope which surrounds the body of the sun, (spots having a diameter of 31,000 miles, and 45,000 miles have been observed) are known to observe a regular order in their formation. They advance from their minimum number to their maximum in about five years, and decline again to their minimum in five years; thus moving in uniform cycles of ten years.

Of the cause producing these remarkable phenomena we are profoundly ignorant; with the law which regulates their position on the sun's disk—although their place is curiously well defined—we have not the slightest acquaintance. We only know, that in some years as many as three hundred spots have been examined, and that year by year they decline, until not more than thirty-three or thirty-four make their appearance during one annual revolution of this planet around the sun. Beyond this, however, we do know, that *the earth's magnetic intensity varies in exact obedience to the changes which take place in the number of solar spots.*

Again, it has been discovered that when our magnetic needles exhibit, as they sometimes do, a singular disturbance, which is called a "*magnetic-storm*," indicated by increased and continued vibrations, a large solar spot is in process of formation. A small magnetised bar of steel upon this earth sensibly feels some power in action on the far distant sun. Great phenomena, probably similar to the revolving storms of the tropical regions, occurring upon the centre of our planetary system, appear to be the cause—certainly the disturber—of that singular and important power, which we call TERRESTRIAL MAGNETISM.

R. H.

THE MIRACLE ROD OF THE PROPHET.

"GIRD up thy loins," spake Elisha to his servant, Gehazi, as the Shunammite had entreated him concerning the quickening of her son, "and take my staff in thy hand. If any one meet thee, salute him not; and if any one salute thee, answer him not again, and lay my staff on the face of the child, that his soul may return to him again."

Joyfully did Gehazi speed away with the wonder-working rod of the prophet, after which he had aspired so long, for, for a great while it had been his chief desire to do a miracle. "Whither hastest thou so fast, Gehazi?" called Jehu, the son of Nimshi, to him. "To raise a dead one," answered Gehazi: "for here is the prophet's staff."

Full of curiosity, the crowd assembled and ran behind him: from every village and town, through which he came, the people hastened after—to see the raising of the dead. And with hasty steps Gehazi went before them, and when they came to Shunem, he stepped forward and laid the staff on the face of the boy. But there was neither voice nor hearing.

Then he turned the staff about and laid it otherwise, to the right, to the left, upward, downward: but the boy arose not, and Gehazi was mocked of the multitude. Confounded, he turned him back to the prophet, told him what had befallen, and said, "The child is not raised!"

Then Elisha took the staff and hastened to Shunem, and went into the house, and shut to the door before them all, and prayed to the Lord, and went up and laid himself upon the child, and put his mouth upon the child's mouth, his eyes upon his eyes, his hands upon his hands, and lay upon him till the body of the child grew warm. But wherewith did he warm the body of the child? With his still, humble prayer, with the breath of his unselfish, disinterested love.

"Take up thy son," he said to the happy mother; and the vain Gehazi stood ashamed.

From the German of Krummacher.

REVIEW OF THE MONTH.

With the merely prohibitory or restrictive aspect of the Sabbath question, we have less sympathy than with efforts to endear the day and improve it for its noble purposes. Doubtless, "thou shalt *not*" occurs in the commandment; but it is most in accordance with the spirit of the Gospel to set forth the positive blessedness of the actual observance. And we earnestly hope, that enlightened and large-minded men may be led to grapple with this problem, so as to indicate methods by which the Sabbath and the sanctuary may be rendered attractive to those who now waste and profane the one and forsake the other.

Meanwhile, it is very cheering to observe the great increase in England of open-air preaching. In Birmingham, Bristol, and Liverpool, as well as London, much good has thus been done; and in Cambridge it is gratifying to know that several under-graduates have held such services in the streets of that town, attended by numbers of the "common people." The students wear their academic costume, and the University authorities do not interfere.

Originating, we believe, with one who has spent and laboured much in the cause of Sabbath observance, John Henderson, Esq., of Park, the Edinburgh Tract Society is publishing a series of papers on the subject, entitled, "Tracts for Working Men and their Fire-sides." Including contributions from Canons Stowell and Miller, Professor Miller, the Rev. Dr. Guthrie, J. A. James, W. Arthur, &c., it promises to be a first-rate series. And we have been not a little delighted with a packet of single leaves, "The Sabbath: Is from God—Is not Jewish—Is made for Man—Is a day of gladness and not of gloom," &c., by the Rev. T. Alexander,—terse, pithy, and warm-hearted, and, with their tinted paper, for purposes of distribution very taking.

John Foster's ideal of ministerial independence was, to be owner of his own place of worship and pay his own salary. On some such autocratic principle, our friend, the Rev. J. B. Dickson, has started his serial, "The Temple-Lamp," of which he himself is at once editor and sole contributor. After all, the Miscellany is more varied than some which boast an ample staff of authorship; and, in the numbers already published there are articles of a very high order in theology, practical Christianity, and mental philosophy, besides stories and poems. Mr. Dickson is a man of genius, and his compositions glow with enlightened and ardent piety.

We have been much pleased with two little volumes published by the Sunday School Union,—Lectures to Children "On the Bible," and on "Scripture Doctrines," by Mr. Green. They avoid the common errors of childishness and irreverent familiarity; but they are affectionate, interesting, and impressive.

Amongst the last items we gather from that comprehensive and excellently-conducted periodical, "The News of the Churches," and its contemporary, "Evangelical Christendom," we are happy to observe that a deep awakening is spreading through the Lutheran churches of Sweden and Norway, the former especially; and that the prospects for religious toleration in Prussia begin to look brighter. Since the French seizure of Tahiti and the introduction of Romanism, there has been a sad moral depravation as well as spiritual decay in that once flourishing mission-station; but in other isles of the Polynesian group the progress is great, and among the Feejee islanders cannibalism is all but abolished, and the way is everywhere open to missionaries. There is danger, however, lest through the machinations of a Romish priest the French may be led to seize upon Tonga, and repeat on that interesting island the wrongs they have inflicted on Tahiti. In their present obscurity the romantic aborigines of America are too seldom remembered; but they have not been forgotten by the American churches, and it is not a little cheering to find how great has been their success, more especially among the Choctaws and Cherokees. In the former nation there are 1494 communicants, and their churches during last year contributed 1279 dollars to benevolent objects. The great mass of the Cherokee nation can read, and there has sprung up among them a strong desire for books, which are in process of being supplied by colporteurs.

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PIONEERS AND FIRST-FRUITS.

JUDSON IN BURMAH.

ADONIRAM JUDSON was born in Massachusetts, America, August 9, 1788. His father, who was a minister, was a vigorous-minded man, but too anxious that his children should be distinguished and clever. And no doubt his eldest son was clever. When hardly able to write, he saw an enigma in a newspaper, with a challenge to any one who could solve it. Adoniram wrote out the answer, addressed it to the editor, and put it in the post-office. Suspecting that it was some mischievous prank of the minister's son, the postmaster took the letter to his father. The old man was so much struck with the solution that next morning he said, " Here is a book of riddles I have bought for you. It is a very common one; but as soon as you have solved all that it contains you shall have more difficult books." And then patting him on the head with more than usual affection, the old man added, " You are a very acute boy, Adoniram, and I expect you to become a great man." The book of riddles turned out to be a book of arithmetic, and although a little disappointed at first, the young student set to work with such ardour that he soon gained a reputation for his attainments in the science of numbers. Such was the fame of the little prodigy, that before he was ten years of age a gentleman sent him a problem, with the offer of a dollar if he could find out a solution. For a whole day he shut himself up in his chamber, and pondered it without success. Next day his little brother was taken ill, and he was sent for to amuse the invalid. Whilst slowly piling up a cob-castle, " That's it! I've got it!" he exclaimed, as he sent the materials rolling over the floor, and ran off to his own room to write out the calculation. The dollar was won, and his fame was established.

John Foster was right when to a friend, congratulating him on the birth of a son, he said, " If the fellow turns out *good*, I shall not so much mind about his being extra clever. It is goodness that the world is wretched for wanting, and if all were good none would need to be able." The elder Judson had nearly destroyed his first-born in his excessive desire to see him distinguished. The boy grew conceited, unamiable, and absurdly ambitious. He had taken " fire into his bosom," and he was " burned." There was nothing in the way of earthly eminence, however extravagant, to which he did not inwardly aspire ; and before he was fifteen his day-dreams represented himself as the most illustrious poet or statesman of the future America. But then the damping thought crept in,—Suppose he reached the pinnacle, could he retain it for ever ? The sages and heroes, whose renown made him almost mad with hopeless rivalry, had long since gone down to the dust, and a hundred years hereafter what comfort would it be though the world were ringing with his fame, and he himself not here to enjoy the glory ?

He was sent to college. It was early in this century when a flood of free-thinking swept over America. In the class above Judson was a young man of the name of E——, brilliant, witty, and popular, but a determined Deist. Between him and the minister's son there sprang up a close intimacy, which ended in the latter becoming, in his own opinion at least, as great a sceptic as his friend. He told his parents that he had ceased to believe in Christianity. His father's stern reproofs and arguments were hailstones on adamant; but his mother's tears penetrated his conscience like drops of fire, and could not be forgotten. He was twenty years of age. He had joined a company of players at New York, and now, in order to see the world, he set out on a solitary tour. One night he stopped at a country inn. Lighting him to his room, the landlord mentioned that he had been obliged to place him next door to a young man who was exceedingly ill, in all probability dying, but he hoped that it would occasion him no uneasiness. Judson assured him that, beyond pity for the poor sick man, he should have no feeling whatever. Still the night proved a restless one. Sounds came from the sick chamber—sometimes the movements of the watchers, sometimes the groans of the sufferer—and the young traveller could not sleep. Just through that wall, he thought, there is an immortal spirit about to pass into eternity, and is he prepared? And then he thought, "For shame of my shallow philosophy! What would E——, so intellectual and clear-headed, think of this boyish weakness?" And then he tried to sleep; but still the picture of the dying man rose up to his imagination. He was "a young man," and the young student felt compelled to place himself on his neighbour's dying bed, and he could not help fancying what, in such circumstances, would be his thoughts. But the morning dawned, and in the pleasant daylight his "superstitious illusions" fled away. When he came down-stairs he inquired of the landlord how his fellow-lodger had passed the night. "He is dead," was the answer. "Dead!" "Yes; he is gone, poor fellow! The doctor said he would probably not survive the night." "Do you know who he was?" "Oh, yes; it was a young man from Providence College—a very fine fellow; his name was E——." Judson was completely stunned. Hours passed before he could quit the house; but when he did resume his journey, the words "Dead! lost! lost!" were continually ringing in his ears. He now knew the religion of the Bible to be true; his godless spirit was in despair; and as he turned his horse's head towards Plymouth, he rode back to his father's house a crushed and crest-fallen penitent.

The belief of the Gospel, to which he at last attained, gave him peace with God. His projects of literary and political ambition had passed away like guilty dreams, and he asked no other question than the one which ought to be supreme with every monument of mercy, "Lord, what wouldst Thou have me to do?" He pursued his studies for the Christian ministry, and the perusal of Buchanan's "Star in the East" turned his thoughts to the heathen. In 1810 a Board of Commissioners for Foreign Missions was formed by the Associated Churches of Massachusetts, and this Board undertook to send Mr. Judson, Mr. Newell, and some others, to India. The spirit in which he went will be best understood from the following letter to the lady who was to share his toils and dangers, written on the first day of 1811:—

"It is with the utmost sincerity, and with my whole heart, that I wish you, my love, a happy new year. May it be a year in which your walk will be close with God; your frame calm and serene; and the road that leads you to the Lamb marked with purer light. May it be a year in which you will have more largely the spirit of Christ, be raised above sublunary things, and be willing to be disposed of in this world just as God shall please. If our lives are preserved and our attempt prospered, we shall next new year's day be in India, and perhaps wish each other a happy new year in the uncouth dialect of Hindostan or Burmah. We shall no more see our kind friends around us, or enjoy the conveniences of civilised life, or go to the house of God with those that keep holy day; but swarthy countenances will everywhere meet our eye, the jargon of an unknown tongue will assail our ears, and we shall witness the assembling of the heathen to worship idol gods. We shall be weary of the world, and wish for 'wings like a dove, that we may fly away and be at rest.' We shall probably experience seasons when we shall be 'exceedingly sorrowful, even unto death.' We shall see many dreary, disconsolate hours, and feel a sinking of spirits, anguish of mind, of which now we can form little conception. Oh, we shall wish to lie down and die."

On the voyage to India Mr. Judson was led to change his views as to the lawfulness of infant-baptism; and, consequently, had to resign his appointment as agent of the Society which sent him out, and soon after his arrival in Calcutta he was peremptorily ordered out of the country by the agents of the East India Company. But both these incidents, which occasioned much temporary distress and difficulty, were overruled for great good. His change of opinion on the subject of baptism led to the formation of what is now known as the "American Baptist Missionary Union;" his banishment from India laid the foundation of the Burmese Mission.

Burmah is the extensive country lying betwixt India and China. With its mountains rich in gold, rubies, and silver; with its wells of petroleum and its beds of amber; with its forests of teak and catechu, and trees of some sort or other yielding fruit every month; with its boundless capabilities of culture, and with rivers, like the noble Irrawadi, to convey its treasures to and fro, Burmah is one of the most favoured regions which bask beneath the tropic noon. But "man is vile." Its government is the most absolute form of despotism. The whole inhabitants are one vast family of slaves, of whom the king is the owner. Life and limb, person and property, are at his unquestioned disposal; and whilst the highest in the land throw themselves in abject prostration before the "golden foot," entreating for a glance from the "golden eye," or a favourable word from the "golden tongue," the palace itself is an object of virtual worship, and when they draw near it passengers dismount and take off their shoes. The religion is Buddhism, with its curious tenet of the transmigration of souls. But although the five precepts of Buddhism are, Thou shalt not take life: nor steal: nor commit adultery: nor lie: nor drink intoxicating liquors,—so powerless over the heart and conscience is this system that no people of the East are more rapacious and cruel. They are "a nation of liars," and one who knows them well has declared, that although "under pain of many years' suffering in hell Buddhism forbids theft and falsehood, there is not a single Burman in the country, who, if he had a good opportunity, without danger of detection, would hesitate to do either." And not only is life very cheap, but death is usually inflicted with every refinement of torture.

Standing half-way betwixt India and China, the Burmese race combines the qualities of the Hindoo and the Chinese; although more closely resembling the latter. With olive complexions, and straight coarse black hair, and a figure rather short, but firm and vigorous, they are capable of more exertion than the soft and effeminate Bengalee; but they have neither the ingenuity nor the industry of their Chinese neighbours. Many of the men are able to read, but the comforts of life are few; and with all the vast capabilities of the soil, most of it is impervious jungle, the haunt of the tiger, the leopard, and wild elephant, or mountain forest, the unvisited domain of the ape, the antelope, the parrot, and the cobra-de-capello.

It was in the year 1813, that Mr. Judson took up his abode at Rangoon. One or two feeble efforts had already been made to introduce the Gospel; but at the time of Mr. Judson's arrival, there did not exist a single Burmese Christian. Nor was it for six years that he and the associates, who afterwards joined them, saw any case of inquiry so satisfactory that they could venture to confer the ordinance of Christian baptism. After this, however, the work went steadily on. The Missionaries preached in a spacious apartment, prepared for the purpose; the New Testament was translated into Burmese; the children were taught; tracts were circulated; and in 1824 not only did the native Church number eighteen exemplary members, but the influence of Christianity was becoming perceptible in the improving population around.

In this year, however, a storm burst over the Mission. Hoping to establish a branch-station in the capital, Mr. and Mrs. Judson had gone up to Ava. But before their arrival hostilities had commenced betwixt the Burmese and the British. A suspicion, not altogether unnatural, seized the government that the white strangers were spies of the English; and one day as they were preparing for dinner an officer entered, with a black book in his hand, and attended by a dozen Burmans, one of whom from his spotted face they knew to be the executioner. This ruffian instantly seized Mr. Judson, and bound him so tight with cords that he was nearly strangled, and hurried him off to the death-prison, whilst Mrs. Judson was left arrested and in the charge of Burman soldiery. A dreadful place was that death-prison. The gaolers were all branded felons—some blinded of an eye, others mutilated of their nose or ears, or with a mark burnt into their cheek; and, being the vilest of the vile, they found a fiendish pleasure in tormenting their victims. Built on the ground and with a poisonous miasma rising from the damp earth, the prison itself was so unwholesome that, betwixt disease and hardship, its inmates were constantly dying; and yet, replenished with captured outlaws and murderers, English soldiers and sepoys, courtiers in disgrace and rich merchants, whose wealth the sovereign coveted, this chamber of horrors was constantly full. And as there Mr. Judson and his companions lay, with three sets of fetters fastened round their ankles, and day after day passed on, and week after week, witnessing the horrible tortures with which one victim after another was despatched, and wondering when their own turn was coming; outside Mrs. Judson was using every effort to procure their deliverance, or, at least, a mitigation of their sufferings. She interceded with the sister of the king, she bribed the officials, she brought food to the prisoners; and as with the intrepidity of a martyr and the zeal of an angel she passed through the streets of Ava on her mournful labour of love, she became an object of sympathising admiration, and was surrounded with a halo even in the eyes of the brutal Burmese.

Amidst all his anxiety for his heroic partner and for their only child, who was born soon after the desolation of their home, there was another object which occasioned Mr. Judson much solicitude. This was his translation of the New Testament. A part of it was printed, but should the remaining manuscript be lost and his own career now terminate, it would be many years before any other missionary could reproduce the book he had prepared for Burmah. To relieve his mind Mrs. Judson stitched up the manuscript in a little pillow on which he might rest his head, as he lay with his fettered ankles on the prison-floor. The pillow looked so mean and felt so hard that the gaolers did not covet it, and as long as it was there the author hoped that should he himself rest from his labours his work would survive him.

After seven months of captivity, one day a band of men rushed into the prison-yard, and seizing the white prisoners, added two pairs of fetters to the three they already wore, and then dragged them into an inner dungeon. It was the commencement of the hot season, and as a hundred wretched beings writhed and gasped on the floor of this dark and air-less den, they grew almost frantic with pain and suffocation. But night arrived, and a whisper ran round that at three in the morning the foreigners should be led out to die. At the news some bold men grew weak, and at first the missionary felt a pang that he must go at last without saying farewell to his unsuspecting wife and child. But "gradually the feeling changed, and he would not have had it different. She had left him in comparative comfort that day; she would come the next and find him beyond her care. It would be a terrible shock at first; but she would be spared much anxious suffering, and he could almost fancy that she would soon learn to rejoice that he was safe in glory. He felt thankful, too, that the execution was to take place in the night. He should pass his own door on the way. There he might breathe his silent farewell, while she was spared the parting agony. He thought of Burmah, too, even then. The English would most likely be conquerors; and then there would be nothing to hinder the propagation of Christianity. He even recollected—so calm and dispassionate were his thoughts—some passages in his translation capable of a better rendering; and then he speculated on the pillow he had lost that day, weighing the probabilities of its ever falling into his wife's hands, so that the manuscript would be recovered. At length the fatal hour drew nigh. They had no means of ascertaining it precisely, but they knew that it could not be very far distant. They waited with increased solemnity, then they prayed together, Mr. Judson's voice for all of them; and then he, and probably each of the others, prayed separately. And still they waited, in awful expectancy. The hour passed by, they felt it must be passed, and there was no unusual movement in the prison. Still they expected and waited, till finally there woke a glimmering of hope, a possibility that they had been deceived. And so, hoping, and doubting, and fearing, they lingered on, till the opening of the door assured them of what they had long suspected. It was morning, and for this time at least the alarm had been false."

Just at this time a singular accession was made to the inmates of the prison. The king had received the present of a lion from some foreigner, and now some superstitious people tried to persuade the king that the lion was in league with the British, who bore a lion for their ensign, and so the noble animal was doomed to the death-prison. A strong cage was provided in the yard, "and now commenced a new and fearful scene of misery. The unhappy prisoners had seen men starved, and beaten, and smothered, and strangled to death; but there was something almost supernatural in this new horror—a gradually-starving lion! Day after day, the noble beast writhed in the pangs of hunger, parched with thirst, and bruised and bleeding with his fearful struggles, while his roarings seemed to shake the prison to its foundations, and sent a thrill of indescribable terror to the hearts of the occupants. Sometimes a compassionate woman would steal to the cage after dark, and thrust a morsel of food between the bars; but it was necessarily a trifle to the powerful beast, and served only to increase his ravings. At other times one of the keepers would throw pails of water over him, which would be greeted with almost human shrieks of pleasure, though it only served to lengthen for a little the terrible term of suffering. At last the scene was over. The skeleton of the poor beast was dragged from its cage and buried;" and Mr. Judson, who in the inner prison had been seized with fever, succeeded in getting himself transferred to the lion's empty den. In its ample space and better air, he gradually began to recover.

The miseries of one-and-twenty months we have no heart to detail: but few things in the history of modern barbarism are more harrowing than the insults and tortures heaped on those hapless captives, and few things in the history of modern devotion are more affecting than the faith and magnanimity with which these hardships were sustained. Surrounded with mercenary wretches and murderous ruffians, amidst pain and contumely and in the daily shadow of death, the benevolent purpose which had brought these disciples of the Saviour to Ava never faltered; their heaven-kindled consecration to the Burmese people never changed to bitterness; and in the spirit of their Divine Master their prayer for their cruel oppressors was still, "Father, forgive them, for they know not what they do." Mrs. Judson came daily to the prison, where her efforts to mitigate their miseries rendered her a guardian angel in the eyes of the inmates; and, leaving her infant to be taken care of by its father, she would hie away in quest of provisions, or to plead for some indulgence with a sordid and stony-hearted underling, and then return to carry home the child, and bid an adieu which might be followed by no good-morrow.

At last the Burmans were fain to sue for peace, which they purchased by the surrender of large territories. The missionaries and other foreign prisoners regained their freedom. To his unspeakable delight Mr. Judson found the manuscript Testament safe in his own house, to which a faithful attendant had carried it from the death-prison, where he found it thrown aside as rubbish, on that dismal day when its owner was locked up in the inner dungeon. And, what was equal cause of rejoicing, the native Christians had continued steadfast, and some had made such progress in Scriptural knowledge and piety, that soon afterwards the missionaries ordained them as pastors to labour among their countrymen.

A few months after this great deliverance, Mr. Judson lost his high-hearted and saintly partner, and soon afterwards their little Maria was laid in her mother's grave.

But the work went on. The annexation of so much of the country to the British empire was itself a prodigious advantage. In those regions life became sacred, and property secure; justice was impartially administered, and the profession of Christianity was attended with no sort of danger. The missions at Arracan and Maulmain received a remarkable impetus; and more especially amongst the Karens — an oppressed and scattered people, who occupy among the Burmans a place similar to that of the Anglo-Saxons under their Norman conquerors — the progress of the gospel has been as rapid as its results are cheering. And now the Missionary Union has in Burmah 29 missionaries, and 129 native assistants, with 1062 scholars, and upwards of 7000 converts. This great salvation the father of the mission was allowed to witness before he in peace departed. He died at sea, April 3, 1850.

As combining eventful incidents with high personal attainments and ministerial success, perhaps no biography altogether equals that of Dr. Judson since the days of that other eminent missionary the Apostle Paul. Of his adventures and his usefulness we have already spoken: we may now notice a few of his personal characteristics.

He was blessed with a clear understanding and a sound judgment. Some subjects he had to examine anxiously, but after his mind was made up nothing could shake his conclusion. As long as men are believing for other people it is like supplying goods by contract; they take it for granted, and have no fears but that all is sound and solid. But when the said contractor begins to build a house for himself, and when a flawed pillar or a single rotten girder might be the death of himself and his children, ordinary conscientiousness is quickened into unusual carefulness; every brick and beam is tested. Dr. Judson was no mere theologian; he was a man of faith. He was building for eternity, and not only was he careful to keep on the right foundation, but he was anxious to select trustworthy materials. On every stick and stone of the structure might have been stamped the word "warranted."

And the conclusions of his clear understanding, with his eminently practical turn, became elements in his daily existence. "His simple and confiding faith seemed to place him in direct communication with God. It never appeared to him possible for a moment that God could fail to do precisely as He had said. He believed that Burmah was to be converted to Christ, just as much as he believed that Burmah existed. He believed that he had been sent there to preach the Gospel, and he as much believed that the Holy Ghost would make his labours in some way, or at some time, the means of the salvation of the nation, as he believed that there was a Holy Ghost. During his visit to Boston a venerable friend asked him, 'Do you think the prospects bright for the speedy conversion of the heathen?' 'As bright as the promises of God,' was the prompt reply. The same unshaken confidence in God was manifested in all affairs; in prayer he asked not as a duty, nor even as a pleasure, but he asked that he might receive."

His adamantine strength of will; his perseverance; his apostolic love to the heathen; his astonishing mastery of the language, in which he preached with more fluency and power than in English, were all elements in his success. But the greatest element of all was his holy consecration. After his deliverance from prison, and the death of his wife and child, he began to look on this world as merely a scene for the discharge of duty. The only world which had any charms for him was that one into which were gathered all whom he most dearly loved, both created and uncreated. That world was constantly present to his mind, and as he thought on its beloved and sinless occupants, he longed to be like them. He sought to mortify in himself every sinful habit and sense-ward tendency, and panted after that Christian perfection which loves man heartily and God supremely. Finding that missions were languishing for want of funds, he threw into their treasury his patrimonial estate. Finding that his nicety and love of neatness interfered with his labours among the filthy Karens, he devoted himself to nurse the sick labouring under the most loathsome diseases. Finding that his youthful love of fame was not utterly extinguished, he threw into the fire his correspondence, including a letter of thanks he had received from the Governor-General of India, and every document which might contribute to his posthumous renown. And finding that his soul still clave to the earth, for a period of several weeks he quitted all his friends, and, subsisting on a little rice in a bamboo-hut on the edge of the jungle, for several weeks gave himself entirely to communion with God.* And although some may think that in all this he strove to "wind himself too high," it must not be forgotten that a low stature, or a languid faith, will never raise a besotted people, and he would need to have a firm hold on heaven who tries to lift a nation from the miry pit of heathenism. We know not if it is usual for Christianised nations, as well as individual converts, to repeat the lineaments of a spiritual father; but if it be so, we may hope that coming years will see many noble examples of self-renunciation and devotedness to God, of holy heroism and living for eternity, among the believers of Burmah. H.

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* Memoirs (English Edit.), vol. i. 434. From the pen of that "master in Israel," Dr. Wayland, this is one of the most edifying and arousing contributions which the present century has made to our store of Christian biography.

THE CHILD AND THE SWANS:

AN EMBLEM.*

MARK yonder little child at play,
Rejoicing in the sunny day;
How innocent her glee!
See! now she is a horse again,
And prances with her tiny wain
Along the shady quay.

More slowly now she wends along
And mocks the sparrow's homely song;
Now stops and looks sedate.—
Oh, say what infant trouble lies
Beneath those sorrow-speaking eyes;
Why droops her little pate?

It is because among the trees,
The little birds in twos and threes
Have all together flown;
And there they stretch their merry throats,
And warble back each other's notes
While she is all alone.

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* See p. 9. Although our correspondent is evidently unacquainted with the stanzas of Adrian Spinniker, in whose "Zinnebeelden" the subject is expounded at length, his version of the device is scarcely less spirited and successful than the original.

She hastens to the river-side
Where, drifting slowly with the tide,
A boat drops on its way;
But while she hears the sailors sing,
They hoist the vessel's great white wing
And leave her in dismay.

But oh! what joys await her there;
For on that river broad and fair
There swims a noble swan:
With haughty neck and snowy pride,
She calls her cygnets to her side,
And gracefully glides on.

The child forgets her waggon toy,
She clasps her hands, she shouts for joy,
And bids them come and play.
They move towards her through the stream,
While myriad sparkling ripples gleam
Along their silvery way.

They gather round the little maid,
She stoops to meet them nought afraid,
And hopes their games to share;
But now fresh trouble fills her heart,
They will not come to draw her cart,
She may not join them there.

She lingers o'er the river's brink
And wonders whether she would sink
If she were with the swan;
She understands no "reason why,"
So drops her ball as if to try—
But now where has it gone?

She scarcely saw it float, before
The swan has darted from the shore
And carried it away.
Ah! see, she thinks to leave the land,—
But Heaven bless that mother's hand
That forces her to stay!

COMPARISON.

This child 's an emblem of the soul
That 's left in youth without control,
When all things seem but toys;
It wanders through the maze of life,
Then, wearied with the lonely strife,
It sighs for other joys.

The Syren "Pleasure" waiting near
Wafts mystic music to the ear,
And bids it join her train;
Then Conscience wakes her stern alarms,
For none who "sink" within her arms
Return to life again.

But Folly, spurning all reproof,
Shuns Wisdom's path and stands aloof,
Still ling'ring to depart;
Till Heaven's merciful command
Bids Sorrow snatch with sparing hand
The suicidal heart.

T. S.

THE DULL WATERING-PLACE.

(*Concluded.*)

ELEANOR was so absorbed in reflecting on her aunt's remarks, that she did not notice the question which concluded them. So, after a few seconds, Mrs. Mortimer spoke again,—

"Well, Eleanor, what comes next?"

"I don't know, aunt. You talked of fishwives and fishermen on the beach, and mending of nets, and all sorts of things."

"Never mind about the mending of the nets; though I think I see those boys and women with their shuttles darting, still. But they and the tall tarred houses all go into your portfolio, Eleanor. Those beautiful studies, you know, which you can hardly get done in the first month of our stay!—Ah! it has just come into my head! I thought there was something else before we left the beach."

"What is it, aunt?"

"Natural history, my dear. Some particular branches of it however,—Shells, Seaweeds, and Zoophytes."

Eleanor's countenance fell.

"I don't know much about those things, aunt—only about shells. They are really beautiful."

"So are seaweeds and zoophytes, Eleanor; as, indeed, is everything which God created and made, the small as well as the great. Indeed, for one reason the small *more* remarkably so than the great, because it fills the mind with a kind of wondering awe to learn that things and beings invisible to any human eyes are formed and created with the same exquisite beauty and contrivance as those larger ones which seem more particularly adapted to adorn man's world—the world revealed to his senses. Then, too, how interesting to compare the universal perfection of God's works with the universal imperfection of those of man! *We* create and make solely for ourselves—*our* range of eyesight is our measure, and we take the natural range of our senses as the guide of what is perfect and good. But look at the result! Alter the range of your sense of sight by the power of the microscope, and the finest-pointed needle that can be made becomes to all appearance an untidily-formed iron pole, with a miserably rough attempt at a polished end. Whereas the hairs on a fly's leg, or the sting of a wasp, or the feelers of an animalcule, invisible to the naked eye, show a finish and delicacy which the utmost powers of the finest microscope cannot trace into roughness. Besides, your tastes for natural history are at a particularly low ebb when you can like nothing but *denaturalized* shells, pretty as they are!"

"But I can't like the other things, knowing nothing about them, aunt."

"Well, then, for a few minutes let us stop here. Suppose that the smuggler's tale is over, and that *you* have turned away to think, and *he* to finish his quid of tobacco. Suppose, too, that the wind is so high (a south wind observe, and therefore not cold), that your sketch must be suspended—what is to hinder your coming with me to shelter between two large boats that are hauled up on the shore? Come! there is a piece of tarpaulin lying there, and we will sit down. It will not be as dull as you suppose."

"I don't expect it to be dull a bit, aunt. I am as ready to sit there as you are. The very smell of the tar is enough to make me like it."

"Very well! Then, there we are. Now, just by the edge of the tarpaulin to the left you will see a nasty mound of dirty shells. 'How came they there?' you will ask. Thus: they were thrown over the side of the boat after she was hauled up on the beach. I suspect the sailors used the fish last night either for bait or supper. Well: they are only waiting for the next tide to wash them back into the deep."

"Joy go with them, my dear aunt!" cried Eleanor.

"Now, I am quite disappointed in you, Eleanor! I thought you were fond of shells."

"So I am of nice polished ones, aunt; but not of the nasty heaps I once before saw on a beach. They had such a dreadful smell, the very thought of it makes me sick!"

"Ah, Eleanor!" cried Mrs. Mortimer: "you have much to learn yet, I see. It is a great fact, that *naturalists have no noses*, and if you are coming to sit by me on the tarpaulin, you must leave your nose on the Parade with the well-dressed ladies who never descend the fishermen's steps, but look upon them as little better than a plunge into Avernus."

"I am quite prepared, aunt. I will leave my nose, or fix it solely on the idea of tar. Anything to come and sit with you."

"Well, now, those shells are great favourites of mine, so I must introduce them to you. They are called 'Pectens;' and there are two varieties of them there. Some mottled and some white, all but the raised ribs, which are a delicate pink or yellow."

"Why, these are the shells that used to be made into such pretty pincushions and ornaments, aunt?"

"The very same."

"But you talked about a mound of dirty shells. I had no idea those pretty little pectens were there. How I should like to drill the holes, and try to make one of the pincushions! How could you call those pretty shells nasty and dirty, aunt?"

"Everything is nasty till it is washed, Eleanor; such is the fate of mortality; and our friends, the pectens, want a strong lotion from the chemist's shop besides, before all their beauties are developed. But, for my own part, I prefer them—at least the oldest and ugliest among them,—in their natural state, merely washing them in sea-water."

"Explain, aunt."

"Why, those which are most disfigured by scurfy incrustations, bear on their backs some of those wonders which only a microscope can fully reveal to our eyes. But a pocket magnifier or lens can do much, and show you, that those, to the naked eye, disfiguring incrustations, are actually households of little creatures, who have built themselves cells, side by side, diamond-wise, with the nicest regularity; and whose skill in ornamental cottage-building exceeds even that of bees, for in their houses there is no variety, whereas, among the creatures of whom I am speaking, different patterns of houses have prevailed ever since they were created. The finest microscope can show *us* no difference in the little creatures inhabiting the cells; but the race of *Lepraliæ*, as they are called, is divided, as it were, into classes, and each class is as particular and precise in the pattern of his house as a Highlander can be about that of his tartan! Is not this curious? There are more than forty clans of these little Lepraliæ on our British shores only, and there are plenty of others abroad. What do you say now to my dirty shells? Think of the thousands of little creatures—each the inhabitant of his self-built cell—living his appointed lifetime of enjoyment in his 'dim water-world,' on the back of the Pecten, who moves unconscious of his freight. Many of the Lepraliæ prefer building on sea-weeds rather than shells, and many on stones, and some are so particular that it is only on one or two particular weeds they are found: a choice that, like the patterns of their cells, must of course be directed by some mysterious instinct, and proves that these minute creatures are no more forgotten by the great Creator than those who rank higher in the scale of life. Now, then, I have introduced you to a zoophyte. But we cannot stay longer with him. Neither will I, for your young naturalist's nose's sake, poke far into the mound, or doubtless I could drag out thence a small cuttle-fish: another of the fleshy fishes of untidy shape which look so disgusting. He is, indeed, a lump of flesh, all but his mouth, which is a miniature parrot's beak, and hard and horny as that of a bird. Inside he carries about with him his bag of brown ink, which he can throw out at pleasure in the face of any enemy daring to pursue him. But you will, I am sure, prefer seeing the ink in its prepared and refined state when sold in the shops under the name of sepia."

"I should most particularly like to see it in its natural state as well," observed Eleanor. "But I am almost overpowered by the thought of all that exists in the world, unnoticed by so many people. There seems to be almost *too* much, aunt—it burdens one's mind."

"Ay! but who would be so vain or mad as to do more than be happy and contented with the particular researches or occupations that Providence throws in his way, or that really interest and attract his mind? Of all mistakes none is more grievous than the rage for heaping up knowledge merely for knowledge's sake:—crowding one study upon another till the heart is interested in none, and till learning becomes a burden, or a cause of conceit, instead of a resource and comfort. But, come! we will leave the 'dim water-world,' and its inhabitants, to others, and you shall bid good-bye to the beach, and cut across, among the tall tarred rope-houses, to a pathway that runs underneath high overhanging cliffs, to a distant part of the beach. We are past the end of the town here — nay, and, shortly after, we have reached the last of the rope-houses: so now, stop and tell me what you see."

Eleanor looked up, almost feeling as if she ought to be able to answer.

"Yes, yes," continued Mrs. Mortimer, as if it had all been real; "you may turn completely round if you please, and you must look up, and then down, and then I will tell you exactly what you see. First, right opposite to you as you stand with your back to the rock, is a tilted cart, with the shafts raised on wooden props. Yes. Nothing very wonderful in that, you say. Well, if you think so, look again. Take another turn, and look *up* this time. Now, you are standing with your back to the tilted cart and your face to the rocky cliff. Do you see nothing? Nothing! You shake your head. Look a little higher — up the cliff — higher — higher still. Ay! Now you've caught it, for I see you smile. You have caught sight of a window with actual panes of glass and woodwork in the rock, level with the rock, ever so high up."

"My dear aunt, you are getting a little romantic, I think," cried Eleanor, half thinking her aunt was making fun of her.

"I have been romantic all my life, I hope," observed Mrs. Mortimer, with a smile; "but here I have a reality as well as a romance. By looking steadily upward you perceive that at a short distance below the window, there is a jutting ledge of rock, like a pathway; and all at once this fact is verified by a human figure appearing upon it. He came out of a dark-looking fissure to the right of the window, and now he is actually walking along that ledge of rock I spoke of; and now, if he is not standing there with a long broom in his hand, sweeping off the dust and dirt from the narrow pathway that stretches like a rocky shelf across the cliff, more than half-way up its high and precipitous side! And, after the sweeping is over, you may see him walking up and down the ledge with a placid air, looking over the sea, and evidently observing what ships are in the offing, for he is studying them through his telescope. There is a Parade for you, Eleanor! Quite a different sort of thing from the other one."

"Aunt, if the place had nothing else to recommend it but the man in the rock, I would go there to see him, I think."

"The place has a great many more things to recommend it though," observed Mrs. Mortimer; "for the man has a wife and several children, and, besides that, a regular farm establishment up in his home in the rock. I remember, when I was up there——"

"You were up there!—actually up in the man's place yourself, aunt! and one *can* get up?" interrupted Eleanor.

"Decidedly," was Mrs. Mortimer's answer.

"And you saw——"

"Pigs, and a donkey, and ducks, and hens, and chickens, and guinea-pigs, and turtle-doves, and a great many more 'beasts' than anybody but an Irishman could have borne in such close quarters."

"And he is an Irishman, then?" said Eleanor.

"Yes."

"And what is his name?"

"Excuse me, my dear, I decline any questions about names at present. He is an Irishman, and careless and poor; but at the same time ingenious and witty. And so, being unable to pay rent for a cottage after the usual fashion, and having noticed several holes or caves in that part of the cliff, he bethought himself of turning the caves into rooms, pigstyes, and sheds; and by glazing over a large opening that formed a window in the principal cave, and also by very cleverly contriving a sort of chimney through a crevice enlarged, he got a really very decent sitting-room with a fireplace in it, and with such an amount of furniture—even including three or four books—as made it look quite respectable. For the accommodation thus obtained, the poor Irishman pays a shilling a-year to the Lord of the Manor; and there he has lived for many, many years. His pigstyes are not without the ornament of a tidy gate, and he carries on a profitable trade with his ducks and hens; and in a sort of 'entrance-hall' to his principal room, I observed rabbits and a squirrel in a cage, showing that the man keeps animals from a sentiment of regard, as well as merely for use. There seemed, indeed, to me to be a fine Robinson-Crusoe spirit over the whole affair."

"There is, indeed," said Eleanor. "Is it difficult to get up?"

"Very, Eleanor; but there is always a bevy of sailor lads lingering about the ascent if they see a stranger approaching. These boys are of great use, and, indeed, you can scarcely do without their assistance, though I must confess, their roguish faces, half bursting into a laugh at the folly of 'madam' in wanting to go up, made me very ambitious of managing the ascent without them. But I could not succeed, and was at last glad to take the proffered arm. And your cousin, who was with me, and was then a mere child, was escorted up by a sailor lad on each side of him holding up his arms and leading him forward."

"What a lion the man in the rock must be for the watering-place! I suppose everybody goes to see him?" observed Eleanor.

"Not a bit of it, my dear. Of the hundreds upon hundreds who flock yearly to the place, I question if there are a dozen who know of the existence of the Crusoe of the Cliff, or ever saw his window; though, by the way, I have observed it from the sea with the sun lighting it up, glittering in the distance almost like a light-house. The dwelling altogether reminds one forcibly of the prints in Keith's 'Prophecies' of the rocky homes at Petra."

"But how is it, my dear, dear aunt," asked Eleanor, "that the visitors of the place never go to see such a curious sight?"

"Partly from its situation among the rope-sheds and fishing tackle, I fancy, my dear."

"But why is that a reason, aunt?"

"Because so many people cannot energize sufficiently to break away from routine, from the regular London-looking streets, and houses, and parades, and drives. The path that leads to the cliff is at the back of the town, and I own that there is an odour of fish in the neighbourhood which offends delicate noses. It is only naturalists that have no noses, remember. I cannot myself say that the smell of fish and tobacco is absolutely charming, Eleanor; but I do maintain that the cuttle-fishes, and the shells, and the rope-houses, and the Crusoes in the Cliff, fully counterbalance the trifling annoyance."

"Besides, if the people always move in one set way, they must find every place dull."

"That is just what they *do* do, Eleanor, and rail at it for its stupidity, when, in fact, they know nothing of its most amusing side. But how easily they might know! How easily could I, or any one, who, from age or circumstances, was unencumbered by conventionalities, introduce young folks, at any rate, to interesting views of every place on God's earth, even Hastings included? However, I have one more thing to relate, though I see you are as fidgety as a starting colt."

"I really, aunt, don't want you to say any more about the place. I mean, that if you and my uncle will only go there, I shall be delighted; for I would rather go there than anywhere, whether it is really Dover or not."

"Very well. But still you must hear the old woman's story out. Remember now! Before you turned round and saw the window in the rock, you saw a tilted cart propped up by the side of the road. Nothing but that, you said, and yet that cart,—that tilted cart,—is almost as interesting an affair as the home in the rock."

Eleanor looked up at her aunt in doubt, and shook her head.

"Very well, Eleanor. You are just as obstinate after all as the ladies on the Parade. They will have nothing but a parade turn-out, and you will have nothing just now but a house in a rock. You are, all of you, one as wise as the other."

"I give in, my dear aunt,—I give in. Go on. I am all attention. I will look down most amiably from the house in the rock upon the tilted cart on the other side of the path."

"You will do well, my dear," observed Mrs. Mortimer. "Look at the cart amiably,—ay, and attentively; for do you not see a little ladder of steps going up to the front of it from the ground?"

"Oh! aunt, my *dear* aunt!" exclaimed Eleanor, and her work slipped from her knee upon the ground as she gazed in Mrs. Mortimer's face, anticipating, yet not venturing to suggest what she thought she should hear next.

But Mrs. Mortimer turned her head and looked at her niece with a sweet but rather sad smile, as if some touching recollection had crossed her mind, and then Eleanor said, "The cart was inhabited too, aunt."

"Exactly, my dear; it was another home—as strange and poverty-stricken, if not as adventurous in its character, as the home in the rock. I have been up the little steps into the cart, Eleanor, as well as into the cavern home; and a strange sight I saw there. A poor woman was lying stretched out on a little pallet at the end of the cart, with a new-born baby in her arms. Between that narrow pallet and the entrance of the cart, a small iron tube had been stuck up through an opening in the canvas as a temporary chimney; and at the bottom of it burned a small fire, and on the fire was a little pot, in which some gruel was being warmed for the poor sick mother. Some woman, of sheer kind-heartedness, had come in for half-an-hour to help her, give her the gruel, and see if she wanted anything unusual: but when I appeared at the foot of the steps, the woman came down to make way for me to go up, for the place could hardly hold three people. How do you feel now about the tilted cart, my dear? Are you tired of it?"

"I should hate myself if I were not deeply interested, aunt," said Eleanor, looking down and speaking very earnestly. "But do tell me how you came to think of going up into the cart?"

"By an accident; although only a visitor at the place, I had got to know the family in the cart, my dear. The poor woman's eldest daughter, a strong rough girl of fourteen, was in the daily habit of collecting the sea-weeds and zoophytes that were washed up by the morning's tide, and hawking them about the town for sale. She had come to my lodgings among other places, and I always sent for her saucers of treasures into my room, and generally bought something of her. Poor girl! great were the pains she took to wash and arrange the different tinted sea-weeds so as to give a pretty effect to her wares; and at last she and I got to be great friends, and a compact was entered into between us that I was to have the refusal of her collection every day, before she showed it to any one else. It suited both her and me; for the gay pink and green ones that were most attractive I rarely wanted, but purchased of her many a curious dirty-looking thing which would have gone a-begging on the Parade; and at last the girl got to know so well the kind of things I wanted, that she would sometimes say herself, 'I have got nothing to-day, ma'am, that will suit you. They are only what you have had before.' As soon as her sea-weeds were sold, she invested a small sum of money in oranges, and in hawking these, she passed the rest of her wandering day—at least all the time that could be spared from her mother. I have known her walk a distance of four miles in the early morning to gather sea-weeds from the rocks, when the tide did not serve her purpose in drifting them ashore, and afterwards go back to the same place in the afternoon to sell her oranges in the town there, coming back to her cart-home late at night. Our many interviews led to inquiry as to her mode of life and place of abode; and in this manner I became acquainted with the family in the cart, and hurried off to see the poor mother when I heard of the arrival of the baby."

"Why did they live in a cart, aunt? do you know?" asked Eleanor.

"For the very same reason that the family over their heads lived in the rock. They could not afford to pay rent for a house. They came from some inland county, where the mother had, she assured me, respectable relations; but her husband having fallen into poverty (I fear by drinking, though she never said so), they could not 'for shame' stay among their friends. They did not like the disgrace, and so fixed upon this rambling life as a resource. I forget the husband's trade; but he had one. On fine nights, the woman said, the children (of whom there were five) slept underneath the cart. In bad weather they were all huddled together inside. Four other children she had 'buried,' she said; and truly when I looked upon the poor little new-born babe, I could not but think the fate of 'burying' would be a greater boon to it than the fate of 'rearing' under such painful circumstances. They had visited the place I am describing for three successive years, so that they had got to feel it a kind of home. This woman's boys were always ready and willing to help any strangers up to the home in the Cliff; and if you could have heard the woman herself speak of the dwellers in the rock, you would certainly have thought she felt them to be objects of pity as well as curiosity. Yet I can well imagine with what contempt the ingenious Irishman above, would look down on the cart and its inhabitants, and feel that it was his superior genius that had raised him to a situation so much more desirable! You and I, Eleanor, would relish as little the trolloping, tramping life of my cart friends, as the dirt and uncouthness of the Irish folk, whose fowls and pigs lived with them in a sadly too free and intimate a manner to be quite agreeable. But still, as phases of human life, and as the life of creatures like ourselves, preparing 'through much tribulation' for a great eternity, I felt both the cases to be highly interesting, and often and often since I left the place, have I recalled the cavern-room with its solitary window, and strangest of all, its little shelf for books. How grand it must have been to watch a winter's storm through that casement! No winds that ever blew could shake that adamantine dwelling; and to watch the raging sea below them, must have been a strange and awful sight.—I could say a great deal more about the place, and describe an entrance to it unrivalled for beauty, down a hill embosomed by trees. On the one side, a romantic steep scattered over with rocks and furze, amidst which rose the grey old church; the town and castle being visible over the trees before you commenced the descent.

And above all, and beyond all, lying in peaceful relief against the red brick buildings, the bright blue sea, dotted over with white sails, and seen through an atmosphere balmy with the hope and promise of health—a hope which, in my case, was fully realised. . . . Come, Eleanor, ring the bell for tea, for I hear your uncle at the gate. Kiss me, my dear niece. I am wide awake now, and fancy that I see by your face that you have more faith in me than in Lady Charlotte Lennox. And certainly you must make your choice in my favour if you wish to see either the *Butlers* in their home in the Cliff, or the *Sweetloves* in their house in the cart; or to ascertain for yourself the insufferable dullness of ——"

"*Hastings!*" cried Eleanor, springing up and standing before her aunt with a glowing face and almost tearful eyes; and as she thus stood, the door opened and her uncle came in, and all unconscious of the excitement, said, "How odd that you should be talking of Hastings, my dear! You have not heard, mamma, have you, that I have had the unexpected offer of a house there, and we must start to-morrow!"

"Aunt," said Eleanor, when they parted at night, her face radiant with delight, "I hope I have learnt a lesson for life."

M. G.

LIFE, IN ITS HIGHER FORMS.

No. IV. (*continued*).

BIRDS.

WE well remember the wondering delight with which, in childish days, we gazed on a Chaffinch's nest. An elder companion had found it in the fork of an oak, and climbing up to the place, he drew aside the leafy twigs, and revealed the beautiful little dwelling to our eager eyes. The particular construction of that particular one, we cannot, of course, pretend to describe, for it is a great many years ago, and the note-book was not then so familiar to our hand as it has been since, but a vivid impression of the general appearance remains. Indeed, the spruce, smart little Chaffy builds one of the prettiest of British nests; the Goldfinch's is somewhat more compact, and, being composed more of one substance, is neater, but we scarcely know whether we do not more admire the Chaffinch's. Of course you have seen both; Chaffy's certainly, because it is so common and so easily found.

What a beautiful cup of interwoven moss it is!—at least the frame-work, the exterior! The pretty feather-moss (*Hypnum*) is chosen for this, because it grows in long strings, and binds well together; but this is only the outer wall. Wool is the staple; you may see the busy birds in spring collecting the straggling tufts of wool that hang on the thorn-bushes around the sheep-pasture, and carrying off the prizes in their bills: watch one home, and you will have no difficulty in discovering the whereabouts of its domestic economy. But be merciful; look, but touch not! Well does the skilful little architect know the *felting* properties of wool! how, when the fibres are placed in contact, and rubbed and pressed, they unite and bind together into a cloth-like texture, like the substance of a hat, or a piece of drugget. God has put into her feeble sensorium this instinctive knowledge, and how effectively she uses it! Tuft after tuft of wool is brought, pulled and spread out thin, and applied to the interior of the mossy cup, each layer placed evenly round, so that the thickness shall grow uniformly, and each addition united to the fixed portion by the pressure of the bird's breast, she sitting in the hollow and moving briskly round and round, pressing the wool with all the force of which she is capable. A sort of sewing process goes on at the same time; for individual fibres of the wool are passed around projecting branches of the moss, and being inserted into the walls by means of the bill, are seized on the opposite side, drawn tight, and passed through again and again, every effort adding to the strength, compactness, and neat appearance of the growing nest. The united cobwebs of the spiders that lurk in hedges and banks are also brought into requisition for this sewing work; bits of cotton and thread from the neighbouring dwellings, and many other substances: and thus the house is made. But it is not quite ready yet; it must be strengthened on the outside, by intertwining long strings of moss around the contiguous branches, and binding them with felted wool, thus weaving the bush itself into the common structure. It is because of this connexion that it is next to impossible to take a nest without so damaging it as nearly to destroy all its beauty; it cannot be removed without being almost torn to pieces. Then it must be adorned with little bits of grey and yellow and green lichens, stuck on the outside and bound down with cobweb, which doubtless greatly improve the beauty of their house in the eyes of the tasteful owners,—Mr. and Mrs. Chaffy.

Well, then, the exterior is finished:—now it must be lined. Moss and wool are soft and warm, but something softer and warmer must be procured before it is a fit cradle for five naked tender birdlings. Besides, it must be made smoother than it is. Now the birds go a-searching along the lanes and over the commons for stray hairs, especially those of cows and of rabbits and hares; these they introduce, and coiling them round the cavity, render it beautifully smooth and globular. The soft small body-feathers of other birds are then sought, particularly those of the ducks in the farm-yard, and interwoven with the hair; and the structure, now complete, is looked on with complacency by the industrious pair. The Chaffinch, however, does not make so much use of feathers for lining as some other of our small birds.

The Goldfinch, as we have said above, makes a more compact structure than this, as it is careful not to leave a single projecting sprig of moss or filament of down, binding down the whole into a smoothly felted surface. It is fond of moss and wool, but does not much use hair or feathers for a lining, preferring the down of catkins, of the coltsfoot, cotton-grass, and other downy plants of the season. It has been, however, observed, that birds will commonly take the materials for building which they can most easily procure, within certain limits of resemblance of course, and always having regard to their suitability, and to the general plan and style of the building. "On the 10th of May, 1792," says Bolton, "I observed a pair of goldfinches beginning to make their nest in my garden; they had formed the groundwork with moss, grass, &c., as usual, but on my scattering small parcels of wool in different parts of the garden, they in a great measure left off the use of their own stuff, and employed the wool. Afterwards I gave them cotton, on which they rejected the wool, and proceeded with the cotton; the third day I supplied them with fine down, on which they forsook both the other, and finished their work with this last article. The nest, when completed, was somewhat larger than is usually made by this bird, but retained the pretty roundness of figure and neatness of workmanship which is proper to the goldfinch."*

But we, in this country, have no nest that can compare for neatness with the tiny structures built by the Humming-birds of the Western hemisphere. That of the smallest of birds, the Vervain Humming-bird (*Mellisuga humilis*) of Jamaica, we have often had an opportunity of seeing in those lovely hesperidan glades. It is usually affixed to the upper side of a horizontal twig of bamboo, just over a joint, so that the diverging twigs are embraced by its foundation. Fancy a little hemispherical cup, about as big as the half of a walnut, made of a bay-coloured down, the produce of the silk-cotton tree, most compactly interwoven, and mingled with the glossy down of an *Asclepias*. Externally it is quite covered with spiders' webs, crossed and recrossed in every direction, and made to adhere by some viscous substance, evidently applied after the web was placed, probably the saliva of the bird. These webs are used to confine little bits of pale-green lichen, which are stuck about here and there, and impart a rustic prettiness to it. To see a bird sitting in a cup like this is very amusing; small as is the species, it seems impossible that it should be able to crumple itself up sufficiently to be contained in so tiny a cavity, especially when two eggs are lodged in the bottom; but the incubation is managed. The head and tail are both excluded, the latter projecting erect; the belly and feet alone are contained within the circumference, which they completely fill.

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* "Harmonia Ruralis," i. Pref.

A volume* of great interest has been written, devoted exclusively to the various kinds, forms, and materials of birds' nests; and the subject is far from exhausted. We, as yet, know comparatively little of the nests which are constructed by the hundreds of species of birds from foreign, especially intertropical, countries, that crowd the shelves of our museums. Yet, among those with which intelligent travellers have made us acquainted, are found some of the most curious and admirable examples of the constructive faculty.

Thus the Baya, or Indian Sparrow (*Ploceus Philippensis*), described by Sir William Jones and others, is said to make a nest "of grass, which he weaves like cloth, and shapes like a bottle, suspending it firmly on the branches, but so as to rock with the wind, and placing it with its entrance downward to secure it from the birds of prey. His nest is usually suspended over water, and it is popularly believed that he lights them with fire-flies, which he is said to catch alive at night, and confine with moist clay or with cow-dung."

This novel mode of lamp-lighting is so strange, and almost incredible, that it has been doubted by some; but the testimony of independent observers of veracity, who set themselves to examine the facts, confirms the vulgar supposition, that illumination is the object desired.

The interior of this pensile nest contains several apartments, used by the parent birds for different purposes: one of them, consisting of a little thatched roof over a perch, without a bottom, protects the cock-bird from the sun or rain, as he cheers the sitting hen with his song.†

In South Africa, a curious pendent nest is formed by the Tchitrec, one of the flycatchers. Le Vaillant thus describes it, on the authority of his intelligent Hottentot hunter, Klaas: "In one of our journeys through a wood of mimosas, in the country of the Caffres, he discovered and brought me this nest, having seen, he said, and particularly observed, a male and female Tchitrec occupied in constructing it. It is remarkable for its peculiar form, bearing a strong resemblance to a small horn, suspended with the point downwards, between two branches. Its greatest diameter was two inches and a half, and gradually diminishing towards the base. It would be difficult to explain the principle upon which such a nest had been built, particularly as three-fourths of it appeared to be entirely useless and idly made; for the part which was to contain the eggs, and which was alone indispensable, was not more than three inches from the surface. All the rest of this edifice, which was a tissue closely and laboriously woven of slender threads taken from the bark of certain shrubs, seemed to be totally useless. The interior of the nest was not furnished with any sort of soft material, such as down, wool, or hair; but as the female had not laid her eggs when Klaas brought it to me, it is probable that the nest was not quite finished; a fact, indeed, proved by the birds being still at work at the time."*

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* Rennie's "Architecture of Birds." London, 1831.

† Forbes's "Oriental Memoirs," i. 119.

In Jamaica, we have seen an interesting nest made by a Starling, of brilliant black and yellow plumage, and provincially known as the Banana bird (*Icterus leucopteryx*). It is a deep purse, suspended by two opposite points of its margin, between two parallel twigs of a tree, and composed sometimes of horse-hair, sometimes of long vegetable fibres, which can scarcely be distinguished from hair. "The hairs or threads are procured one by one, and carried to the selected spot, where they are deposited in a loose heap. From this accumulated mass of material, the work is carried on, and progresses rapidly when once begun. When a few threads are laid and interlaced for the base, the work becomes perceptible and interesting. Both birds work together; one, taking a thread and weaving in one end, holds down the loose part with his beak, while his mate takes the ends of others projecting, and lays them tightly down over it, interweaving them with others. Other threads are crossed in the same manner, in every direction, until a slight but very compact purse is made, resembling a loose cloth. As it hangs, the texture is so thin, that a person below can discern the eggs or young within."*

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* "Ois. d'Afrique," iii. 129.

An old lady in America, to whom Wilson was showing a similar nest to this, asked him, half in jest, half in earnest, if he did not think it possible that birds might be taught to darn stockings. There are some nests in the British Museum, which half incline us to think that the owners might learn to hem handkerchiefs. They are those of the Tailor-bird of India (*Orthotomus longicauda*), a beautifully plumaged member of the family of the Warblers. "It first selects a plant with large leaves, and then gathers cotton from the shrub, spins it to a thread by means of its long bill and slender feet, and then, as with a needle, *sews the leaves neatly together* to conceal its nest. . . . Often," says the describer, "have I watched the progress of an industrious pair of Tailor-birds in my garden, from their first choice of a plant, until the completion of the nest and the enlargement of the young."† Other authorities affirm that it "*picks up a dead leaf and sews it to the side of a living one.*"

One of our native birds, the Long-tailed Tit (*Parus caudatus*), familiarly known by the homely names of "Poke-pudding," "Long Tom," &c., makes a nest which has been much admired for the ingenuity of its construction, combining security, warmth, compactness, and beauty. It is a hollow ball of moss and wool, profusely lined with soft feathers, and having only a small hole for entrance; not unfrequently the structure is prolonged into the shape of a bottle, the entrance being through the neck. But the bottle-nests of the Pensile Grosbeak of Africa (*Loxia pensilis*) far exceed ours in ingenious adaptation for security and defence. Pringle describes them as suspended, twenty or more from a single tree, attached to the tips of those twigs that hang over a precipice. The body of the nest is spherical, and the entrance, which is always from below, is through a cylindrical gallery of twelve or fifteen inches in length, which projects from the body, exactly like the neck of a chemist's retort. The whole fabric is most ingeniously and elegantly woven of a species of very tough grass. The object of the precaution displayed in the construction, and in the position chosen, is evidently the protection of the eggs and young from the baboons and monkeys that would otherwise devour them.*

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* "Birds of Jamaica," 228.

† Forbes's "Oriental Memoirs," i. 55.

We must reluctantly close our enumeration of singular nests, with one, whose chief curiosity is the exhibition of that social instinct, which, as in the bees, wasps, and ants, among Insects, prompts each individual to work on a common plan for the general good. The Pensile Grosbeaks, just described, associate in their domestic economy, but there is no union of labour. Another bird of the same family, and of the same country,—the Sociable Grosbeak (*Loxia socia*) of South Africa, builds in concert a huge irregular sloping roof of thatch around the stem of a tall tree, beneath the eaves of which each pair of birds builds its own nest. So numerous are they, however, that the nests are in contact with each other, and appear to form but one structure, distinguished only by the little aperture of each. Le

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* Ephemerides.

Vaillant describes one roof which he examined, which contained beneath its eaves three hundred and twenty inhabited cells.

We have devoted this article to nests; but there are some examples of architectural skill among birds, which require a passing notice, though they are constructed for a very different purpose. We allude to the playing galleries of the Bower-birds of Australia, specimens of which may be seen in the British Museum and in the Zoological Gardens at the Regent's Park. The Spotted Bower-bird (*Chlamydera maculata*), for instance, collects twigs and sticks, and builds them so as to form a long tunnel or gallery, cylindrical interiorly, where it is lined with long grass. The birds then bring together large quantities of stones, shells, and fragments of bone, with which the floor is paved; this pavement, which expands beyond the opening at each end, serves to strengthen the structure and keep it steady. Besides this, they carefully search for the gaily-coloured feathers of parrots and other birds, which they interweave into the sides of their bower, and also arrange the whitest stones and shells in the most conspicuous places, with a keen eye to ornament. The gallery being complete, the birds use it for play, chasing each other through it; and that not only by pairs, but numerous individuals associating to use (and, therefore, probably to build) the same gallery. One of these bowers, now in the British Museum, was, when found, four feet long and eighteen inches high. P. H. G.

A NIGHT AMONG THE BREAKERS.

Having been appointed to go out on a special mission to Canada, I proceeded to Liverpool with the view of sailing from thence to New York. It was in 1846, and about the middle of September, when the best of the season was over, and when we had every reason to apprehend that the equinoctial gales, which very often set in about the end of that month, would overtake us in the course of the voyage. This was a source of considerable uneasiness to my companion, who had a nervous dread of the sea, and whose acquaintance with it had hitherto been confined to occasional trips along the coast. But apart from this there were other circumstances which made the prospect before us a subject of some anxiety, not only to her, but also to the most of our fellow-passengers.

At the time to which I refer sailing by steam across the Atlantic was scarcely past its experimental stage. Although the project had been tried, and the practicability of it fully established, there was still a considerable number, even of sensible people, who continued to question the perfect safety of this mode of transit, and who on that account preferred going by the packet-ships, or "liners," the most of which were yet on the station. It was especially doubted whether steamers of a large size could stand the strain of "the great sea;" and it was very generally believed that vessels of heavy tonnage, and of more than ordinary length of keel, were exposed to special risks arising from the peculiar nature of the navigation. Persons experienced in these matters were heard to declare that such vessels were by no means well fitted to contend with the "crested wrath" of the Atlantic; and they brought forward many reasons to show that it was almost impossible they could ride over the tops of its great Alpine ridges without having their timbers started, their backs broken, and their machinery loosened and shaken to pieces. These speculations were, no doubt, suggested in a great degree by the fate of the famous monster ship the "President," whose mysterious disappearance during the previous winter had left a deep impression on the public mind.

Now it so happened that the vessel in which berths had been engaged for us was the "Great Britain," the largest steam-ship ever built, with the single exception of the President herself. But, besides her immense size, she had also been fitted up with the screw-propeller — another dangerous feature, as was thought at the time—and was the first that ventured on such a long and stormy voyage without the steadying and approved *support* of the broad paddle-wheels. To add to all the other insecurities of the case, our Captain, a brave and enterprising naval officer, had taken it into his head to shorten the passage by cutting right out through the North Channel, instead of following the safer, though more circuitous route by which his predecessors sought their way to the open sea.

There was, however, one consideration which tended to relieve the fears of many, and to reassure the minds of most, namely, that the Great Britain had already accomplished one trip to America and back again, not only with entire safety, but with complete success. It was also well understood that she was sound and sea-worthy in every sense, that the utmost care had been bestowed upon her construction, and that she was in reality the strongest as well as the finest specimen of naval architecture that had ever been launched from the celebrated dockyards of the Clyde. This was to some extent visible in her very aspect. In spite of her vast dimensions she had no appearance of unwieldiness about her. On the contrary, she sat lightly on the water, was moved and managed with the greatest ease, and looked, as she was, a perfect model of grace and beauty. On this account she attracted much notice at the time, and was in fact one of the great sights of the day. People came from all parts of England to obtain a view of her; and on the morning on which we left, Liverpool was crowded with strangers, collected together from every quarter, for the purpose of seeing her set off on her second voyage to the New World. Besides being laden with a large and valuable cargo, there were upwards of three hundred and eighty passengers for whom berths had been taken on board of her. The weather was on the whole favourable, for though the sky looked somewhat dull and cloudy, there was no rain, and comparatively little wind. As we proceeded to the Cobourg Dock we found the streets and wharves in the neighbourhood filled with a dense throng of spectators. Though it still wanted a couple of hours of the time of starting, the thoroughfares were already so completely choked up that it was with some difficulty we forced our way to the place of embarkation. This crowd, as we were told, had begun to assemble before the sun was well up, and there they were contented to stand hours upon hours, with their faces turned towards the spot where the steamer was lying, eagerly waiting for the moment of her departure. As that moment approached these congregated thousands, pressed together by continual accessions, assumed the appearance of one fixed immovable mass, steady as a wall, and at last nearly as still as a stone. It is no fanciful statement to say that they were "all eye." They seemed afraid to withdraw their glance even for an instant, lest the object of their curiosity should suddenly dart out from the stone basin in which she was locked, and disappear from their view before they had time to get a sight of her.

The hour of sailing at length arrived, and, punctual to her time, the Great Britain moved slowly out of her berth, and rested for a little over her anchor in the stream. There was a suppressed cry from the crowd as she appeared, but it was quieted immediately again. During this interval, and while the engineers were engaged in feeding the furnaces and getting up the steam, the vessel shook several times from stem to stern. Simple and natural as the circumstance was, the impression it produced was so curious that I was led to mark it particularly. It was for all the world like the tremors and quiverings of high-wrought emotion. It seemed as if the great ship was actually conscious of the trial that was before her, as well as of the intense interest felt about her, and was seized with fits of trembling excitement, which ran through every fibre of her huge frame in successive thrills of nervous agitation. In the course of a few minutes all was ready. The pilot took his place at the helm, the captain on the gangway, the officers at their respective stations, and the Great Britain, covered with a brilliant array of flags and pennons, which bent over her like a rainbow, slipped her cable and started down the stream, wreathed in the smoke and fire of her own guns. This parting salute was immediately answered by several of the shore batteries, whose discharges were met, and muffled, and almost drowned by the mighty roar that broke from the immense multitudes around the docks; which roar was at the same moment caught up and re-echoed by multitudes equally immense who now appeared on the opposite side of the river. As we moved down through the busy tiers of merchantmen that lined the banks and loaded the bosom of the Mersey, we found their decks crowded with spectators, and their rigging covered with their crews, who hailed and followed us with renewed hurrahs upon hurrahs as we approached, and passed them by. Such a rolling whirlwind of admiration and enthusiasm I never witnessed. The passengers on board, though evidently stunned at the extent of it, soon caught the infection. Shaking off the sad thoughts which hung heavily on the minds of many of them, after parting with friends and kindred whom they might never see again, they tried as well as they could to acknowledge the cheers which were still sent after them, both from the shipping and the shore; and to join in the acclamations of applause that were heaped upon the noble and beautiful ship, with whose fortunes their own were, for the time, so closely associated. When we had cleared the narrows of the river, and opened up the breadth of the channel, the captain ordered the sails to be set. The breeze which had freshened a little since the morning, blew right after us; and as the Great Britain united the qualities of a fast-sailing barque with those of a steamer she was soon enveloped in a snowy cloud of canvas, and scudding along at the rate of seventeen knots an hour, after receiving the most splendid ovation that had ever been conferred on any private ship before.

Having had no sleep on the previous night, and feeling also somewhat exhausted by the painful leave-takings and public rejoicings which followed each other in strange confusion during the day, we retired to our cabin immediately after dinner, in the hope of securing a little rest. We soon discovered, however, that this was a vain expectation. The ship was as full of racketing and noise as a country inn in the height of a fair. What with the many hundreds who were pacing back and forwards overhead, and the multitudes more who were chattering away in the adjoining saloon, it was plain enough that there was no chance of rest for us, or for anybody else, as long at least as the sea kept quiet, and the daylight lasted. We therefore proceeded upwards to breathe the fresh air, and to have another parting look at "the white cliffs of Albion." We found the great body of our recent messmates assembled on deck. It was what sailors call a *flush-deck*, that is, open and level from end to end of the vessel; and such was the extraordinary size and solidity of the Great Britain that it looked, with all these promenaders moving about it, far more like the street of a city or the esplanade of a palace, than the deck of a ship, that was not merely floating, but almost literally flying through the sea.

It was now between four and five in the evening. The sky, which had opened up a little in the course of the afternoon, letting out some straggling rays and occasionally long slanting sheets of grey light, had again assumed a leaden and lowering aspect; and, on looking towards the land, we were disappointed to find that it was no longer visible. A drizzly fog, which was fast sweeping out seawards, hid it completely from our view. We were passing near the Isle of Man by this time, and there were many strangers on board who were anxious to get a sight of it, but nothing could be discovered beyond the dim outline of the hills looming darkly through the haze. The evening breeze felt so moist and chilly, that after taking a few turns we were glad to adjourn to the saloon again; and there we tried to amuse ourselves by watching the different groups that were scattered about us; in order, if possible, to form some idea of the social ingredients of which they were composed. The first glance at the motley assemblage sufficed to show us that these ingredients were as various and heterogeneous as the contents of a witch's caldron. While the great majority, as might be expected, consisted of English and Americans, there was at the same time a large infusion of foreigners; and by questioning one of the stewards on the subject I ascertained that we had passengerss on board from nearly every part of the world. They were of all ranks and professions, including counts, ambassadors, scientific professors, literary writers, lawyers, physicians, divines, &c. &c., besides mercantile men and commercial travellers without number. My informant told me in particular, and with a sort of sly chuckle at the contrast, that among them was Madame *Somebody* (I forget her name) with her band of Bavarian singing-girls, and no fewer than fifteen clergymen to keep them all in order besides. As the evening advanced the saloon assumed a very gay and animated appearance. Those who were not contented with books or conversation had recourse to various devices by way of finding amusement for themselves. Some took to chess-playing, some to draughts, some to cards, and other similar games ; but I was glad to find that the prevailing taste ran in favour of music. Among the ladies there was discovered a number of first-rate musical performers, who very kindly played and sang during the most of the evening. Up to the time that we left, the piano continued to be surrounded by a large circle of interested listeners, many of whom joined in the songs that were sung with considerable taste, so that the hum of voices in the saloon was laid and harmonised by the pleasant stream of melody which kept issuing from this quarter.

As it drew towards nine o'clock we retired once more to our cabin, and after devoting some time to private reading and prayer, I was thankful to observe that my dear fellow-voyager had, in a great degree, recovered her composure, and was now rather disposed to smile at the imaginary fears which had haunted her for some days past. This gave me all the greater comfort, as it held out the hope that she would be able to take some rest, of which she had had so little for several nights before, that I was really afraid lest she should fall ill on the voyage. Much relieved by this thought, I threw myself half-dressed into my berth, and fairly overcome with sleep, I dropped at once into the land of dreams, despite of all the singing, and drumming, and talking, that was going on in the saloon. This state of unconsciousness, however, was but of short duration. It could not have lasted more than ten minutes, when I was awakened by a sudden pull, accompanied by a sharp sense of pain in my right arm. Starting up, I found that my wife had hold of it, and was clinging to it with a convulsive grasp. "Oh, there is something wrong!" she cried. "Rise! rise! Don't you hear the confusion on deck?" At the same instant I heard the captain shouting from the gangway, "Stop her!—stop her! Let go the sheets! Down with the sails!" This was accompanied by a rush of feet across the decks, and by sounds and motions from beneath of the most alarming nature. The dreadful truth flashed upon me at once. The Great Britain was aground! Her bottom was grating against the rocks, and we felt her plunging and struggling forward, as if in a state of mortal agony!

In the midst of all this I was up and dressing. Having only my coat and shoes to put on, I was on my way to the quarter-deck in the course of a few seconds. The sight that met me in passing through the saloon was one that I shall never forget. I had already, ere leaving our berth, heard shrieks of terror and confusion proceeding from thence, intermingled with stifled groans and expressions of despair. "The ship is on the rocks!" "We are lost!—we are lost!" "O God, have mercy upon us!" Such were some of the expressions which broke from the crowd of miserable beings whom I had left but half-an-hour before in so different a mood—singing, and laughing, and chatting away in all the lightheartedness of social gaiety and thoughtless security! It was not without some difficulty that I managed to make my way through this most painful and pitiable scene. The floor of the saloon was literally covered with poor women lying in dead fits, or rolling in violent convulsions, surrounded by groups of friends and relatives, who were themselves in such a state of distraction as to be able to afford them but little help.

When at last I reached the companion-door, the view which presented itself there was as wild and gloomy as possible. The night was pitch-dark; the rain was pouring down in torrents; the wind was whistling shrilly through the cordage of the ship, while the sea was hurling its billows up to her bulwarks, and sending its spray in thick drenching showers across her decks. The question which pressed itself upon my mind at this moment, and I suppose on the mind of every one on board, was this: "Where were we? On what point had the vessel struck? Was it on a sunken rock out at sea, or on some reef near the shore?" If the former, there was but little probability that we should be saved, for the ship was heaving and plunging so heavily against the ground that it was not possible she could stand these violent shocks for many hours without falling to pieces. If the latter, there was still, by the help of God, some chance of escape; and I immediately set myself to provide for it by securing one of the life-buoys which I found hanging by the lee-side of the vessel. To this I intended to fasten my companion, and being myself a good swimmer, I could float by her side, and watch over her till I saw her safely landed on the shore. Whether it was owing to mere recklessness, or rather, as I hope, to the sustaining effect of a better feeling, I never lost my presence of mind for a moment. I was kept quite free from the influence of that frightful panic which had seized on almost every one on board, and was therefore enabled to make my arrangements with the most perfect coolness and deliberation. Having done so, I was preparing to return down for the purpose of getting my friend on deck, when, to my great joy, I thought I could discover traces of land. By this time my eyes had become accustomed to the darkness, and peering keenly over the gunwale of the ship, with the life-buoy in my hand, I was sure that I saw the outlines of hills in the distance. Looking still farther around me, I observed, about half-a-mile a-head, a sudden ray thrown across the waters, which I knew at once to be the flash of a revolving lighthouse. It was now certain that land was near, and I felt a thrill of thankfulness the moment that conviction came home to my mind. There was yet, thank God, some hope of deliverance, even though the vessel should fall asunder, as was but too likely, from the fierce assaults of the waves, and from the tremendous force with which she was striking against the bottom. Hastening to our berth, for the purpose of telling my companion what I had seen, and announcing the plan I had formed in the event of the ship giving way, I was much pleased to find her in a state of wonderful composure, calmly engaged in reading her Bible, while in the saloon immediately beside her nothing could be heard but the most distressing moans and lamentations, accompanied by renewed screams of alarm at every lurch the vessel gave. One of the American ministers tried to tranquillise their minds, by offering up a prayer; but the excitement under which they laboured was so great that few were in a condition to listen to him, and he proceeded, in the midst of such outcries and interruptions, both from above and below, that his voice indeed was scarcely heard; so that his efforts, well meant and rightly directed as they were, had little or no effect in quieting the agitation that prevailed. After again committing ourselves to the protection of Him who holds the waters in the hollow of His hand, I went upon deck a second time, with the view of ascertaining, if possible, on what part of the coast we had been cast away. The first person I met on landing above was the captain, to whom I put the question. He very frankly told me that he could not distinctly say where we were, but that if I would accompany him to his own room we could look over his charts together, and perhaps be able to form some idea of the matter. After examining these charts very carefully, and considering the track we should have followed, the time since we left Liverpool, together with the rate of speed at which we had been sailing, we fixed on a certain point on the Irish coast where the captain supposed we were then lying. This conjecture, however, turned out to be incorrect, and the reason why so little was known of the course which the vessel had kept is still involved in mystery. Indeed the causes of this strange and signal disaster, though they gave rise to much discussion and speculation at the time, have never yet been clearly explained.

Returning from the captain's room, I again took a close and particular survey of the circumstances in which we stood, as far as these could be discovered. The rain still continued to fall, and the night was dark as a wolf's mouth. By a gradual change in her position, the ship was now lying broadside on to the breakers, which on that account played upon her with additional force, and often made a clear breach over her. The shocks she received as they rushed in about her with a savage roar, raised her up bodily on the foaming crests, and then dashed her great colossal hulk on the rocks and stones which lay beneath her, were really stunning and awful. It was ruthless work. It seemed as if the waves were determined to bring down the pride of the Great Britain, and to show what they could do in the way of taking out the shine of that magnificent ship, which had just enjoyed such a triumph, and excited such unprecedented admiration, as she sailed away from the shores of England, with her rainbow colours around her, amid the thunder of artillery and the deafening shouts of ten thousand voices. Strange it was to think, that at the very time when the whole country was astir about her; when the coffee-houses of London and Liverpool were ringing with accounts of her; when the reporters of the press were preparing their descriptions of her noble shape, her splendid appointments, her rich cargo, her crowded list of passengers, and vying with each other in their endeavours to give something like an adequate idea of the intense enthusiasm that was called forth by her grand and graceful appearance as she swept that morning out of the Mersey—it was, indeed, strange and suggestive to think that she was at that very time lying a shattered wreck in Dundrum Bay, prone on the rocks, scourged by the billows, grinding the hard boulders of the beach under her broken keel, and groaning through every joint of her bruised and dislocated frame? To add to the effect of this scene, already so striking and so solemn, as midnight approached a thunder-storm came on. The lightning darted from the black clouds overhead, blazed into the midst of the seething breakers, and glared in the faces of the pale and panic-stricken groups that strewed the decks, or lay crouched under the bulwarks. The roll of the thunder was heard mingling in terrific harmony with the roll of the waves, so that it was sometimes difficult to distinguish between them, or to say which was the loudest; or if a rattling peal from above made itself now and then distinctly audible, the sounds were almost immediately imitated and re-echoed by the crash from beneath, as the ship rose on the swell, and was hurled anew against the stony and gravelly ground. I could not have imagined a scene in which all the elements, both of the natural and moral sublime, were so remarkably blended together. Looking at the state of the passengers within, and the state of nature without, there was here presented the nearest approach that I have ever been able to conceive to the highest laws and requisitions of tragedy.

It was now upwards of three hours since we struck. The ship was settling down into the bed which she had made for herself, and the tide had so far retired that her concussions were by no means so violent as they had been. The passengers appeared as if spent and exhausted by the force of their own emotions; and although there was much anxiety manifested on account of the continued uncertainty in which their fate was involved, yet the state of hysterical alarm which had prevailed for a time had gradually given way to sighs of dejection and to feelings of mingled resignation and grief. Taking advantage of this lull, two clergymen walked up together to the upper end of the saloon, and after stating that they were, the one a minister of the Church of England, and the other a minister of the Free Church of Scotland, they invited the passengers to come together for the purpose of engaging in devotional exercises, and casting themselves on the protection of God. This invitation was immediately embraced. The announcement that was made as to the religious denominations to which these clergymen belonged, appeared to have conciliated at once the confidence of all who were present. Word was carried up on deck, and from thence the rest of the passengers, accompanied by the captain, his officers, and crew, poured down in one body into the saloon, for the purpose of joining in the religious service proposed—a service for which every one appeared at that moment to be more thankful than another, not even excepting the foreigners, who knelt devoutly on the floor in the midst of their Protestant fellow-sufferers, and seemed to reckon it a privilege to be allowed to mingle with them on such an occasion. There, in the presence of God and in the midst of pressing danger, all distinctions of creed were forgotten. The feelings of the various parties were too earnest and real to permit them to stand on such distinctions. There was only one man who held aloof, and who refused in a very marked way to approach the band of worshippers, and he was not a foreigner, but an Americanised Scotchman.

In the midst of deep silence one of the clergymen referred to began by reading the 107th Psalm—a Psalm which was felt to be singularly appropriate, and which called forth many a responsive sigh, and many a salt tear, from those who perceived how closely it applied to their own particular circumstances. It drew blood at the very first stroke; for in that strangely mixed audience there were not a few homeless and friendless wanderers, who had been tossed about the world, and who were yet roaming from one country to another without finding any settled resting-place. One can easily conceive the feelings with which they must have listened to the Psalmist's description of their own case as it was then read in their hearing:—

"They wandered in the wilderness in a solitary way: they found no city to dwell in. Hungry and thirsty, their soul fainted in them. Then they cried unto the Lord in their trouble," &c.

There were there also, no doubt, some thoughtless prodigals, driven by their vices from home and kindred, and now reaping the fruit of their folly in the shape of "cold neglect and penury and scorn." How keenly would these words have struck upon their hearts at that solemn moment:—

"Fools because of their transgression, and because of their iniquities, are afflicted. Their soul abhorreth all manner of meat; and they draw near unto the gates of death. Then they cry unto the Lord in their trouble," &c.

This passage was followed by audible groans from different parts of the saloon, and several men threw themselves prostrate on the floor, as if overwhelmed with sorrow or shame. But the passage which comes immediately after it, and which describes so vividly, what had been so fearfully realised by every one on board in the course of that awful night, was accompanied by a general burst of emotion, which, at last, gradually swelled out into something like an absolute wail:—

"They that go down to the sea in ships, that do business in great waters: these see the works of the Lord, and His wonders in the deep. For He commandeth and raiseth the stormy wind, which lifteth up the waves thereof. They mount up to the heaven, they go down again to the depths: their soul is melted because of trouble. They reel to and fro, and stagger like a drunken man, and are at their wit's end. Then they cry unto the Lord in their trouble," &c.

As soon as this most impressive lesson was ended the other clergyman engaged in prayer, which he did in a quiet and solemn tone, evidently intended to calm the agitation of the audience, and to give a more subdued and devotional turn to their too-strongly excited minds. If this was his object he was entirely successful, for those outbursts of natural feeling which had, to some extent, interrupted the reading of the chapter, became gradually less violent, until at last a spirit of deep stillness settled down on the kneeling throng. In the midst of that solemn hush every syllable was heard with the most perfect distinctness. Save the occasional rush of the blast above, and the murmuring sound of the receding waves, there was not a whisper to break the dumb silence that now reigned all over the ship. Every soul there present seemed as if wrapped and absorbed in the exercise of prayer. They held in their breath lest a word should be lost; nor was there. Every sentence fell upon the hearts of the worshippers with a soothing and healing, and, let us hope, a hallowing influence. As afterwards described by an eminent minister,* who was kneeling there among the rest, "it was like oil upon the troubled waters;" and the effect of the whole service in stilling the fearful agitation which had prevailed, more or less ever since the vessel had struck, was perfectly wonderful. While it was going on the ship settled and ceased to move. The wind also, and the sea, went down perceptibly. At the very time that we were crying to the Lord, "He made the storm a calm, so that the waves thereof were still." The congregation rose up from their knees evidently and deeply solemnised, retired quietly to their cabins, and waited there peacefully and patiently till the morning light came, when we were all safely landed on the sandy beach of Dundrum.

W. M'G.

DIVINE THOUGHTS *IN* THE FACTS OF CREATION.

The Distribution of Heat, an idea, as well as a fact.

The sun is the great fountain of heat as of light, and the amount of heat received by the earth is determined, first by its proximity to the sun, and secondly by the line of descent of the heat from the sun to the earth, according as that is more or less direct or slanting.

The path of the earth around the sun is so nearly circular, that there could be no very perceptible difference of heat at one time of the year compared with another, arising from its greater or less proximity. So much is this the case, that although the earth is actually at one period nearer to the sun, *that* is not the warmest but the coldest season of the year. It is the line of descent of the heat from the sun, therefore, which chiefly determines the amount which any part of the earth receives. The path of the earth and its inclination on its own axis secure that the sun's rays shall fall directly on the surface between twenty-three degrees north and twenty-three degrees south of the Equator. These tropical regions, therefore, enjoy a perpetual summer, to which the constitution of their population, rational and irrational, is adapted, and which is connected also with a richness and exuberance of vegetable life, unknown in other climates. To us, it is the height of summer when the sun pours his direct rays on the farthest limit which they reach north of the Equator; and the depth of our winter, on the contrary, is when these rays fall on the farthest limit which they reach south of the Equator. Between the winter and the summer is our spring, between the summer and the winter is our autumn, at both of which seasons the sun's direct rays fall on the Equator.

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* The Rev. Dr. Cox, of Brooklyn.

By this economy, an immense proportion of the earth's population enjoys a temperate climate and a genial and productive soil. What extremes there are of heat and cold are accompanied with this modifying advantage, that they are permanent; so that vegetable and animal organisations are disciplined and inured, and are as much adapted to them as the inhabitants of more temperate regions are to their location. This advantage has an universal bearing. The fixedness of the revolution of the seasons is owing to the fixedness of the earth's axis and of its inclination. Why is not the summer of one year the winter of another? Why is not one year an entire winter and another an entire summer? These questions touch the very possibility of animal and vegetable existence on the earth, and they resolve themselves into another,—Why are the earth's axis and inclination not changeable instead of being permanent? Such *is* the order of the universe. But it might have been endlessly different. Those who are versed in the doctrine of probabilities could tell us, that there are we know not how many chances to one against the existing order. But it is established and secured, nevertheless,—it is a fixed and immoveable *idea,—the* Divine idea unfailingly uttered and embodied.

The tropical regions of the earth receive the directest and largest supply of heat. But the tendency of this element, as indeed of everything in nature, is to equilibrium. Heat is universally diffusive and sends out its influences in all directions, in order to produce an uniform and equable condition. On this ground it is conceived and partly established, that an internal circulation is constantly carried on between the warmer and the colder portions of the earth's surface. The heat which falls upon the torrid zone penetrates deeper and deeper; each month, each week, each day, augments the amount accumulated, and sends it so much lower into the interior. But this accumulation does not lie stagnant beneath the surface. On the contrary, the heat expands and flows north and south towards the poles, and tends to equalise the temperature of the whole globe.*

Besides this internal circulation, there is a manifest and most genial external circulation from the Equator to the Poles, and from the Poles to the Equator. It may be mentioned, in connexion with the chemical phenomena of the atmosphere, that it is almost a non-conductor of heat. The sun's rays descending through it are, to a very inconsiderable extent, absorbed by it, and the heat of the atmosphere of which we speak is not directly communicated from the sun, but is reflected from the earth. The quantity is immense, which is in this way reflected from the earth and absorbed by the atmosphere. Over the torrid zone there might thus, therefore, hang permanently a scorching temperature, and over the frozen zones an atmosphere of ice. But instead of this, between these two extremes there is a constant action and re-action. The heated air of the tropics, specifically light, rising upward, flows through the upper atmosphere in two continuous streams, one towards the south and another towards the north pole. On the contrary, the cold air of the polar regions, specifically heavy, flows along the surface of the earth in two opposite and powerful currents, one from the south and another from the north, towards the Equator. Hence throughout the northern hemisphere, and during a great part of the year, there is a prevailing wind, modified and altered by local and temporary causes, *from* the north, while in the higher regions of the atmosphere the current is as powerfully *to* the north. Exactly the opposite of this, of course, is observed in the southern hemisphere. The effect of this economy, it can readily be understood, is to modify the extremes of heat and cold over the globe. To the same result, also, the diurnal motion of the earth on its axis materially contributes. That motion is from west to east, but it necessarily varies in velocity, as the circumference widens or narrows. At the Poles the motion is inconsiderable, at the Equator it may be taken at the rate of a thousand miles an hour, and from the Poles to the Equator it of course increases proportionally with the span of the circumference till it reaches the maximum which has been named. This rotation from west to east must create a powerful resisting current from east to west all over the earth, which will modify according to circumcumstances, and draw to various points of the compass the winds from the north and south. An additional circumstance must be taken into the account. The earth in its rotatory movement carries its atmosphere, forty-five miles in height, along with it, but not always with uniform velocity. If the motion of the atmosphere were perfectly uniform with that of the earth, the current from east to west would be completely neutralised on the surface. Near the tropical regions, where the width of the circumference perceptibly increases, and where also begins the disturbing effect of excessive heat, the atmosphere is left behind the earth in its rotation. There, accordingly, the currents from the east are so powerful as completely to neutralise those which have been already named as flowing from the Poles. For a great part of the year, therefore, these currents, called trade winds, uniformly in one direction, steadily prevail. But from the Tropics to the Equator, the superincumbent atmosphere is regaining its motion, and at last acquires the same velocity as the earth. The easterly currents are thus variously deflected by the force of those from the Poles till toward, and at, the Equator they are completely neutralised, and the powerful winds are from the Poles, as steadily as if the earth were at rest.*

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* Whewell's "Astronomy and General Physics," Bk. I. Ch. 8.

The science of Meteorology deals with the climate of the globe, with the alternations of cold and heat, and with the phenomena of winds. The sphere is necessarily subject to endless and minute disturbances, arising from local and temporary causes, of which it is impossible to take exact account. But here, as everywhere, Thought reigns,—Thought to which there can be no contingency, and by which the minutest changes are calculated and provided for.

QUÆRENS.

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* Prout's "Bridgewater Treatise," pp. 253–7. Daniell's "Meteorological Essays."

OURSELVES.

NUTRITION (*continued*).

THE ABSORBENTS.

IT will be necessary to go a little out of our direct road (which would lead us, at once, to trace the chyle into the circulation), that the reader may become acquainted with a system of vessels called *Absorbents,* by which very curious and important duties are fulfilled in the animal economy. They are small, extremely delicate, and almost transparent tubes,* which exist in almost every part of the body, with the exception of the brain, the spinal marrow and their immediate coverings, the eye and ear, the hair and the nails. When filled with fluid they have rather a knotted appearance; which is caused by a succession of valves, placed, at irregular intervals, in their interior; and which only open in one direction. Every now and then, the course of the vessels is, apparently, interrupted by the occurrence of small reddish-grey bodies, either isolated or in groups, varying in size from the 20th to the 4th of an inch. These are technically termed *Absorbent glands.*

Anatomists distinguish the absorbents into two sets,—*Lacteals* and *Lymphatics.* The distinction is made, not from any known difference in their structure, or mode of discharging their duties, but rather from a difference in the duties they respectively fulfil. By the Lacteals, the chyle, in a milk-like condition, is conveyed into the blood. They are thus channels for renovation and supply. On the other hand, the Lymphatics are chiefly employed in absorbing and removing, into the circulation, in the form of *Lymph*, all redundant fluids, and the melted materials of the various structures of the body which are continually undergoing renewal and repair.* The *Lymphatics* constitute about one-third of the absorbent vessels, and are distributed through the whole body (with the exceptions already mentioned). Their origin appears to be in the fine web-like membrane by which the different structures of the fabric are tied together, and packed: but they are also found in great numbers in the external integuments ; in the lining membranes of the different cavities; in the mouth and fauces; and in the viscera of the chest and abdomen.

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* If an animal (a sheep or rabbit, for instance) is killed about three hours after eating, the vessels can be readily seen distended with chyle. In order "to demonstrate them," they are commonly injected with mercury, which assumes the appearance of a fine metallic wire.

Beside the duties which the Lymphatics ordinarily fulfil when the body is in a state of health,—the removal, for the renewal of the serum and mucus which moisten, and the oily materials which lubricate the different surfaces; the halitus of the various cavities; the solids, both of bone and flesh, of which there is a constant renovation going on; the fat, as it may be required for occasional use—but they also subserve very important purposes when diseases arise. All processes of ulceration for the discharge of foreign substances, and for the relief of enclosed matter: all evacuations of redundant fluids in different forms of dropsy; the removal of tumours and tumefactions, occurring naturally or induced by medicated stimulants: these and many other such services are transacted by them. As are also the reception and introduction into the system of those drugs, which, though applied externally (as mercury and iodine), act on the body generally.

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* It would be unjust to the memory of two great men, not to mention, even in so cursory a notice as this, that we are principally indebted to William and John Hunter, both most eminent anatomists and physiologists, for our knowledge of the structure and economy of the absorbent system. Before their time, the function of absorption, as far as it was understood, was supposed to be carried on by the veins.

So delicate is the texture of the *Lacteals*, and so very minute are their extreme ends — the immediate points of intersception — that it is still undetermined, whether they imbibe the chyle, directly, by open mouths from the inner surface of the intestines ; whether it is first sponged up by the Villi (already noticed, in the paper on the alimentary canal) in which they seem to originate ; or whether it is filtered into them, through an intervening layer of membrane.

Be that as it may, the radicle tubuli soon unite and form conspicuous trunks. These after wandering, more or. less, between the coats of the intestines, pass into the Mesentery. In their course through it, they become intimately connected with the *Mesenteric glands*, of which there are about a hundred groups. Though they ramify in them, and are seemingly interwoven with the intimate texture of the glands, they do not lose their continuity ; for an uninterrupted channel can generally be made out. From them they proceed on to a common reservoir, called the *recĕptaculum chyli*, the receptacle of the chyle, which lies immediately in front of the third vertebra of the loins. Towards this little reservoir all the lacteals converge, and into it they all empty their contents. It also receives the lymph, collected by the lymphatics, from the inferior extremities and the lower portions of the body.

Though designated by a special name, the receptacle is hardly more than a slight dilatation of the *Thoracic duct*, which arises from it, and of which it forms a part.

This most important vessel* is about the size of a crow's quill. Like the smaller tubes it is almost transparent, very delicate, and is furnished with valves. Passing upwards from the reservoir, it ascends, directly in front of the backbone, through the chest, a little higher than to the top of the breast-bone; then, bending downwards and inwards, it penetrates a vein under the collar-bone, called the *subclavian vein.*

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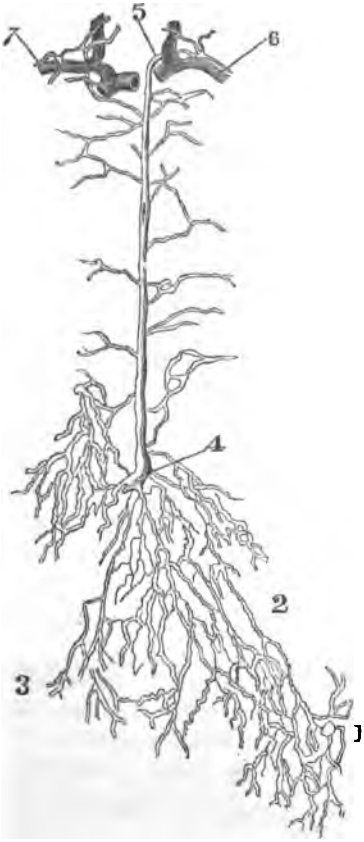
* It is very remarkable that this little tube, the integrity of which is so essential to life, is rarely, if ever, found in a diseased state.



Two little valves, placed at the entrance, allow the chyle to pass from it into the vein, but effectually hinder the blood, which is circulating in the vein, from intruding into it. In its upward course it admits many tributaries, which convey lymph into it from the trunk of the body, and from the viscera, generally. The Lymphatics of the left arm, and the left side of the head, end also in it: while those from the right side of the head and face, and from the right arm, from the right lung and part of the liver, terminate in a corresponding vein on the right side, having previously united into one common trunk.

In the annexed little sketch, the figures 1, 2, 3, indicate the Lacteals and Lymphatics which arise from the intestinal canal, and the abdominal viscera; 4, the receptacle of the chyle; from it to 5, is the thoracic duct. No. 5 also shows where it enters the vein. 6, the subclavian vein. 7, the vein on the right side, which receives the Lymphatics from the right side of the face, &c. The tributaries which terminate in the thoracic duct are also shown, but not marked by numbers. As no muscular fibres have been found in the coats of the absorbent vessels, the motion of the chyle and lymph in them is referred to the movements of the muscles when the limbs and the body are in motion; to a "vis a tergo," an energy from behind; but chiefly to the "sucking power of the heart," by which the blood in the veins, and the fluid in the thoracic duct, and its branches, are drawn to it, as to a common centre.

It will readily occur to the reader, that the contents of the thoracic duct must be of a very mixed character—consisting of chyle deduced from all sorts of food, and of lymph abstracted from such a variety of sources; and that its introduction into the blood requires great circumspection, that it may neither be suddenly surcharged with redundant nutriment, nor loaded with noxious materials. This has been guarded against in two ways. P. S.

THE CLOUD.

"A little Cloud"—1 *Kings*, xviii. 44.

A LITTLE Cloud was fashioned
  In a summer hour
By the love impassioned
  Of the sun and shower.
All day it basked in sunlight
  On the heaven's warm blue,
Round lilies through the dun night
  It hung in dew.

Once when dawn was leading
  In the hot young day,
This little Cloud speeding
  Through the ether grey,
Seemed to float and sail
  On the bright sky's bosom,
Like a dew-drop pale
  On a blue-bell blossom;

So close under heaven
  Did it glide and fleet,
That I thought it riven
  By some angel's feet,
When the breezes parted
  Its veiling screen,
And blue glimpses darted
  Into sight between.

As I gazed came breathings
  On a zephyr's wings,
As of wild wind-wreathings
  Round Eolian strings.

'T was a lark far hidden
In the little cloud,
" Singing songs unbidden,"
Full, and free, and loud.

Oh, it came down-streaming
The clear air along,
Like rills roused from dreaming,
Like a shower of song.
It made me glad and bright,
Brighter every minute,
Till I blessed the cloudlet white,
And the spirit in it.

Then the sun's noon-splendour
Filled the cloud with light,
Though a soft and tender
Yet intensest white ;
And the wanderer weary
Joyed that it was made,
For it gave to him a cheery
And a grateful shade.

Did the semblance of a shadow
On the wide sky pass?
It dusked the quiet meadow,
And the glistening grass;
It dimmed the forest fountain
And the clover lea;
It deepened on the mountain,
Darkened on the sea.

Still though Earth was shaded,
And a gloom was there,

Never dulled or faded
Was the cloudlet fair;
For it ever sailed
Up so close to heaven,
That nothing could have failed
Of the beauty given.

Now a lustre glowing
In the silent west,
From the sun was flowing
As he turned to rest;
And the Cloud borne sunward
Ever nearer, nigher,
Ever floated onward
Toward the sunset-fire;

All its being belted
With a glory bright,
While into heaven it melted
In a dream of light.
Never more glance crossed it
In the sky-heart far,
But where I had lost it
Shone the evening star.

—It is gone, but a lesson
To you and to me
Comes with an impression
Of what life should be.
Sweetly it has taught us;
May our lives, dear child,
With the image it has brought us
Be reconciled.

Like the cloud keep union
  With the pure and high,
Be thy communion
  Beyond the sky;
So all love and graces,
  And a light divine
Shall have pleasant places
  In that heart of thine;

And from thee will shower
  Upon all around
A most precious dower,
  Like the shade and sound:—
Like the music-blessing
  Of lark's ziraleet,
Like the shadow's refreshing
  In the summer heat.

If trouble and sadness
  Be around, above,
Thou wilt drink deep gladness
  From thy Heaven of love;
As when earth was covered
  With a twilight shroud,
Richer radiance hovered
  Round the little cloud.

And when life is ending,
  Oh, how dear to die
Like the cloudlet, blending
  With the glorious sky!
And when unbeholden,
  As its beauties are,
To have memories, golden
  As the lovely star!

X ?

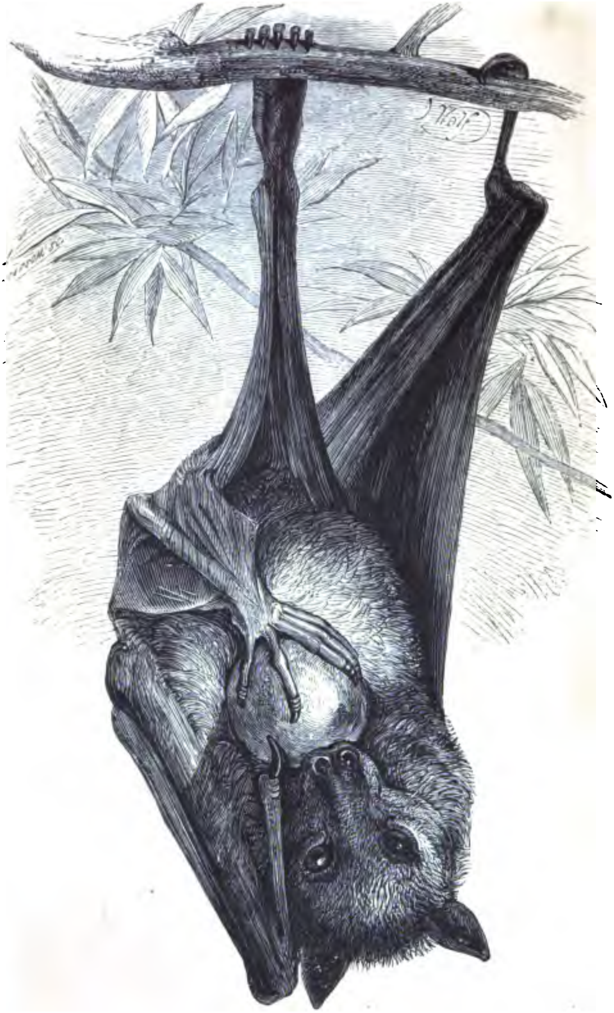
REVIEW OF THE MONTH.

One of the contributors to our pages was Mr. C. M. Charles, whose initials will be recognised in connexion with the series on English Letter-writers. At the early age of thirty, and after a brief illness, on the 31st of July last, he was, by the hand of death, removed from a pleasant home, which cold look or cross word had never saddened, and from a circle of friends whom each successive year attached more closely. Business was Mr. Charles's profession, but literature was his favourite pursuit. He possessed in an uncommon degree that faculty of poetic engineering which Southey claimed for himself, and it was his great delight to plan fictitious narratives. Many of these he wrote fully out, and some of them having been published have found favour with the public: for example, "Claverston," and "Arvon, or The Trials." Latterly he had been turning his attention to critical biography, and an essay on "Alfieri," published early in the summer, is admirable for the sprightliness of its narrative and the vigour of its translations. Knowing him so intimately as we did, we have seldom seen "diligence in business" so well combined with intellectual tastes and the culture of the social affections. His delight was in books and living friends; and whatever might be the seductions of "the unrighteous Mammon," nothing could prevent his timely return to his own homestead, and to the society of his favourite authors. And if, instead of prosperity, it had pleased Providence to try him with reverses, rather than forego mental pleasures and home-felt joys, we believe that he would have endeavoured to reconcile himself and those around him to the humblest fare in the obscurest dwelling. The consequence was, his heart was evergreen and his literary treasures were a fountain of instruction ever fresh and flowing. Was he not right? Is there no such thing as temperance in money-making? Must a man of business be a galley-slave, and know no other end in living, but the adding of penny to penny and pound to pound? Must he coin all his strength and soul, all his heart and mind, into the imperial currency; and instead of love, wisdom, gladness, must he night after night bring home more cash, more cheques and change? Would not many wives and daughters gladly accept an additional hour of a husband's or a father's society in preference to the fashionable mansion, or the expensive dress or jewel? And to many children would it not be a better legacy, the hallowing example and endearing influence of parental converse, than a mere bequest of sovereigns and consols from a piece of money-making mechanism? The career of our departed friend was singularly happy and serene. In the light of the cross he had learned the love of God, and he seemed to expect nothing but good at the hand of his heavenly Father. And in the recollection of those numerous friends whom he attached by his charming cordiality and obliging offices his memory will long be cherished with peculiar tenderness.

Dr. Buckland died at Clapham on the 14th of August, in his seventy-third year. He had held the office of Reader in Mineralogy and Geology in the University of Oxford for forty years; and it would be hard to say whether his vivid and amusing lectures or the romantic volumes of Sir Charles Lyell have gone the farthest to render Geology the most popular of the sciences in England. His "Bridgewater Treatise" gives a good idea of these lectures, with their cheery tone and happy illustrations. It is affecting to know that the last years of this fine intellect were passed under almost total eclipse. In 1845, Dr. Buckland was preferred to the Deanery of Westminster.

From the Mineral Statistics of 1855, compiled with vast labour by Mr. Hunt, we gather the following facts as to the mineral produce of the British Isles last year. The quantity of tin raised was 8947 tons, and, at the average price of 68*l.* per ton, its value was 608,396*l.* Of copper (including, however, foreign purchases), there were 26,078 tons, realising 2,867,207*l.* Of pig-lead there were produced 73,091 tons, at a market price of 1,311,971*l.*; and of silver 561,906 ounces, worth 140,476*l.* Of iron ore there were raised 9,553,741 tons, yielding 3,218,154 tons of pig-iron, worth 13,516,266*l.* Of coals, Durham and Northumberland yielded 15,431,400 tons; Yorkshire, 7,747,470; Derbyshire and Nottinghamshire, 3,065,400 tons; Lancashire, 8,950,000 tons; Scotland, 7,325,000 tons; South Wales, 7,552,770 tons.

Seldom has there come into our hands a volume so suggestive of thought, and so replete with sanctified wisdom, as "Eclectic Notes," written by the Rev. Josiah Pratt, and published by his son. The Eclectic Society of London was a clerical club consisting of such men as Scott, Cecil, Newton, Basil Woodd, Daniel Wilson, Simeon, Goode, J. Venn, which used to meet once a-fortnight to discuss theological and practical questions. During the sixteen years of his attendance, Mr. Pratt took the Notes, now published, and which contain the ripe results and brotherly communings of so many holy and gifted minds. The perusal of this remarkable volume, besides the direct instruction and quickening it is fitted to impart, will, doubtless, incite ministers of kindred sentiment, and within a convenient distance of one another, to go and do likewise.



(Pteropus ruficollis.)

FOX-BATS (*Pteropus*).

In this country that bat is deemed a large one whose wings, when measured from tip to tip, exceed twelve inches, or whose body is above that of a small mouse in bulk. In some parts of the world, however, there are members of this well-marked family, the wings of which, when stretched and measured from one extremity to the other, are five feet and upwards in extent, and their bodies large in proportion. These are the Fox-bats, a pair of which were lately procured for the Zoological Gardens. It is from one of this pair that the very characteristic figure of Mr. Wolf has been derived. There is something very odd in the appearance of such an animal, suspended as it is during the day head downwards, in a position the very sight of which suggests to the looker-on ideas of nightmare and apoplexy. As the head peers out from the membrane, contracted about the body and investing it as in a bag, and the strange creature chews a piece of apple presented by its keeper, the least curious observer must be struck with the peculiarity of the position, and cannot fail to admire the velvety softness and great elasticity of the membrane which forms its wings. It must have been from an exaggerated account of the Fox-bats of the Eastern Islands that the ancients derived their ideas of the dreaded Harpies, those fabulous winged monsters sent out by the relentless Juno, and whose names are synonymous with rapine and cruelty.

Some of these bats, before they were thoroughly known, frightened British sailors not a little when they met with them. Captain Cook, in the narrative of his first voyage, alludes to this; one of the seamen of the Endeavour, when that ship lay off the Australian coast in 1770, during his rambles in the woods, told his messmates on his return that he verily believed he had seen the devil: "We naturally inquired in what form he had appeared, and his answer was in so singular a style that I shall set down his own words: 'He was,' says John, 'as large as a one-gallon keg, and very like it; he had horns and wings, and yet he crept so slowly through the grass, that if I had not been *afeard* I might have touched him.'" Cook's party afterwards encountered this prodigy, which turned out to be a large bat, as big as a partridge and nearly black in colour. The ears of the Fox-bat could readily convert themselves into horns to the superstitious eye of one who fancied he saw Satan, as many artists have figured that minister of evil.

Dr. Forster, who accompanied Captain Cook on the voyage round the world from 1772 to 1775, observed Fox-bats at the Friendly Islands, where they were seen in large groups of hundreds. Our traveller even notices that some of them flew about the whole day, doubtless from being disturbed by the wandering crews of the British discovery ships. He saw a Casuarina tree of large size, the branches of which were festooned with at least five hundred of these pendent Cheiroptera in various attitudes of ease, according to the habits and notions of the bat tribes, who can hang either by the hind or by the fore-feet. He noticed that they skimmed over the water with wonderful facility, and he saw one in the act of swimming, though he cannot say that it did so with either ease or expertness; they are known, however, to frequent the water in order to wash themselves from any impurities on their fur or wings, as well as to get rid of the vermin which may be infesting them.

Captain Lort Stokes found the red-necked species to be very abundant, during his survey of the north coast of Australia in H.M.S. Beagle. As the boats were engaged in the survey, flights of these bats kept hovering over them, uttering a disagreeable screeching noise and filling the air with a faint mildewy odour, far from agreeable to the smell. The sailors gave these bats the name of "monkey-birds," without being aware that naturalists in their systems consider them as following closely the order which contains these four-handed lovers of trees. Captain Stokes observes that the leathern wings have a singular heavy flap, and that a flight of bats would suddenly alight on a bamboo and bend it to the ground with their weight. Each individual struggles on alighting to settle on the same spot, and like rooks or men in similar circumstances, they do not succeed in fixing themselves without making a great deal of noise. When first they clung to the bamboo, they did so by means of the claw on the outer edge of the flying membrane, and then they gradually settled.

Among the wild and varied scenery of those groupes of islands called the Friendly Islands, the Feejees, and the Navigators, species of Fox-bat form one of the characteristics of the place to the observant eye; while, if the traveller should happen to be blind, their presence among the otherwise fragrant forests would be readily perceived from the strong odour which taints the atmosphere, and which, says the Naturalist of the United States Exploring Expedition, "will always be remembered by persons who have visited the regions inhabited by these animals." Mr. Titian Peale mentions that a specimen of the Fox-bat was kept in Philadelphia for several years; and like most creatures, winged as well as wingless, was amiable to those persons who were constantly near it, while it showed clearly and unmistakeably its dislike to strangers.

On its voyage, this strange passenger was fed on boiled rice, sweetened with sugar; while at the Museum, it was solaced and fed during its captivity chiefly on fruit, and now and then appeared to enjoy the picking from the bones of a boiled fowl. The fox-bat is but seldom brought alive to this country. The late Mr. Cross of the Surrey Zoological Gardens, kept one for a short time, and deemed it one of his greatest rarities; and till the arrival lately of the pair alluded to at the gardens in the Regent's Park, we have not heard of other specimens having been exhibited in this country. They are difficult to keep, and seem to feel very sensibly the changes of our climate, while it is a hard thing to get for them the food on which they live when in a state of liberty.

Mr. Macgillivray discovered a new species of fox-bat on Fitzroy Island, off the coast of Australia, when he was naturalist of H.M.S. Rattlesnake.* He fell in with this large fruit-eating bat (*Pteropus conspicillatus*) on the wooded slope of a hill. They were in prodigious numbers, and presented the appearance, as they flew along in the bright sunshine, of a large flock of rooks. As they were approached, a strong musky odour became apparent, and a loud incessant chattering was heard. He describes the branches of some of the trees as bending beneath the loads of bats which clung to them. Some of these were in a state of inactivity, sleeping or composing themselves to sleep, while many specimens scrambled along among the boughs and took to flight on being disturbed. He shot several specimens, three or four at a time, as they hung in clusters. Unless they were killed outright, they continued suspended for some time; when wounded, they are difficult to handle, as they bite severely, and at such times their cry resembles somewhat the squalling of a child. The flesh of these bats is described to be excellent, and no wonder, when they feed on the sweetest fruits; the natives regard it as nutritious food, and travellers in Australia, like the adventurous Leichhardt on his journey to Port Essington, sometimes are

* "Narrative of the Voyage," i. p. 96 (1852).

furnished with a welcome meal from the fruit-eating Fox-bats which fall in their way.

Travellers observe that in a state of nature the Fox-bats only eat the ripest and the best fruit, and in their search for it they climb with great facility along the under side of the branches. In Java, as Dr. Horsfield observes, these creatures, from their numbers and fruit-eating propensities, occasion incalculable mischief, as they attack every kind that grows there, from the cocoa-nut to the rarer and more delicate productions, which are cultivated with care in the gardens of princes and persons of rank. The Doctor observes, that "delicate fruits, as they approach to maturity, are ingeniously secured by means of a loose net or basket, skilfully constructed of split bamboo. Without this precaution little valuable fruit would escape the ravages of the kalong."

We have mentioned that the Fox-bats are occasionally eaten in Australia. Colonel Sykes alludes to the native Portuguese in Western India eating the flesh of another species of Pteropus; and it would seem that but for prejudice, their flesh, like that of the young of the South American monkeys, is extremely delicate; the Colonel says, writing of the *Pteropus medius*, a species found in India, "I can personally testify that their flesh is delicate and without disagreeable flavour."

The Javanese Fox-bat occasionally affords amusement to the colonists as well as natives, who chase it, according to Dr. Horsfield, "during the moonlight nights, which, in the latitude of Java, are uncommonly serene. He is watched in his descent to the fruit-trees, and a discharge of small shot readily brings him to the ground. By this means I frequently obtained four or five individuals in the course of an hour." The natives of New Caledonia, according to Dr. Forster, use the hair of these great bats in ropes, and in the tassels to their clubs, while they interweave the hair among the threads of the *Cyperus squarrosus*, a grassy-looking plant which they employ for that purpose.

William Dampier,* in 1687, observed the habits of a Fox-bat on one of the Philippine Islands, though he has exaggerated its size, when he judged "that the wings stretcht out in length, could not be less asunder than seven or eight foot from tip to tip." He records that "in the evening, as soon as the sun was set, these creatures would begin to take their flight from this island in swarms like bees, directing their flight over to the main island. Thus we should see them rising up from the island till night hindered our sight; and in the morning, as soon as it was light, we should see them returning again like a cloud to the small island till sunrising. This course they kept constantly while we lay here, affording us every morning and evening an hour's diversion in gazing at them and talking about them." Dr. Horsfield describes the species, which is abundant in the lower parts of Java, as having the same habit. During the day it retreats to the branches of a tree of the genus Ficus, where it passes the greater portion of the day in sleep, "hanging motionless, ranged in succession, and often in close contact, they have little resemblance to living beings, and by a person not accustomed to their economy, are readily mistaken for a part of the tree, or for a fruit of uncommon size suspended from its branches." The Doctor describes their society as being generally silent during the day, except when a contention arises among them to get out of the influence of the sun, when they utter a sharp piercing shriek. Their claws are so sharp, and their attachment is consequently so strong, that they cannot readily leave their hold without the assistance of their wings, and if shot when in this position, they remain suspended. A. W.

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* "New Voyage round the World" (1698), p. 381.

PIONEERS AND FIRST-FRUITS.

VAN DER KEMP AND THE HOTTENTOTS.

When in 1650 the Dutch formed their settlement at the Cape of Good Hope, they found the country already in the possession of a curious little people. Their complexion was by no means black, but a sort of sallow,—like a faded leaf, or yellowish-brown, as some authors describe it. With flat noses and oblate faces,—with long narrow eyes far apart from one another, and with little scrubby tufts of harsh curling hair scattered over their compressed, truncated heads, and their remarkably diminutive stature, their appearance was neither commanding nor prepossessing. They spoke a difficult and disagreeable language, full of clicking, guttural sounds; they kept flocks of sheep and herds of oxen, but they had no certain dwelling-place, migrating wherever the exigencies of pasture carried them: and, altogether, their physical and intellectual development was so low, that last century Edward Gibbon could speak of them as seemingly the connecting link between man and the inferior animals.

And, indeed, it was very much as inferior animals that the new settlers treated them. They were, for the most part, deprived of their cattle, and were compelled to tend the herds or drive the oxen of their conquerors. Many of the Dutch boers were intelligent and pious men; but there were few of them who did not share the prejudice against the poor Hottentots, and coarser natures treated them with haughty cruelty. As a Hottentot woman once said, "In the place where I was brought up, I wanted to listen to my master's children when they read in the Bible, but was prevented. Some said, God created the Christians; but your nation belongs to the race of baboons. God be praised that I now know that He has not only created us men, but that through mercy we may be saved through Jesus Christ."* The prejudice still lingers. It is not long since a missionary on his journey sought a night's shelter in the house of a Dutch farmer. He was received with the hospitality characteristic of their class; and before the household retired, the missionary proposed to have family prayer. The farmer assented, and bade his visitor proceed. However, the missionary said, "But will you not call in the servants?" "The servants! Do you mean the Hottentots? I suppose I had better call in the dogs!" Vexed as he was, the farmer called in the Hottentots, and the missionary read the story of the Syrophœnician stranger: "Then came she and worshipped him, saying, Lord, help me! But he answered and said, It is not meet to take the children's bread and cast it to dogs. And she said, Truth, Lord; yet the dogs eat of the crumbs which fall from their master's table." And the sequel gave him occasion to enlarge on the generosity and grace of the Lord Jesus. When, long afterwards, he passed that way again he found that a crumb from that evening's repast had proved the bread of life to a poor hungry soul. He was delighted to make the acquaintance of a well-instructed and warm-hearted woman of this outcast race, who had been brought to the knowledge of the Saviour by that exposition.

Although, as we have said, there were many pious persons among the Dutch, and, although they had amongst them some faithful ministers, it is not a little singular that no one seems ever to have turned his thoughts to these hapless heathen; and it was not till 1737, when their case so touched the heart of George Schmidt, a plain and unlettered Moravian, as to bring him out from Europe on purpose, that the

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* "Missions in South Africa." Dublin, 1832.

Saviour was made known to this despised and ill-used people. Proceeding to Bavian's Kloof, or the Glen of Baboons, where they were at a safe distance from white men, this humble apostle opened his commission; and, although so many centuries had elapsed since the Master said, "Preach the Gospel to every creature," George Schmidt was probably the first who preached it to the Hottentots. God blessed his fervent labours. A settlement was formed, huts were erected, and growing numbers collected to the little village; a school was opened; a congregation of fifty people was organised; a few converts were baptized; and the little valley was often vocal with hymns in which the name of Jesus sweetly sounded. But after five years, having occasion to pay a visit to Holland, the missionary was not permitted to return; and it was fifty years before the Dutch authorities would allow any other to enter on the same field of labour.

John Theodore Van der Kemp was the son of a pious minister of the Dutch Reformed Church at Rotterdam, where he was born in the year 1748. As a student at Leyden, he was noted for his remarkable attainments; but, being of a stirring, active disposition, instead of following a learned profession, he entered the army. Here he continued for sixteen years, a dashing officer of dragoons, but unfortunately a profane and clever infidel, and the slave of vice and ungodliness. However, he married, and his character outwardly improved. He resolved to study medicine, and to perfect his acquirements he came to the famous school of Edinburgh. Thence he carried back to Middleburg, the sphere of his practice, a large store of science, and, in consequence of his intercourse with the deists of Edinburgh, an increased stock of infidelity. In his medical practice he adopted a curious rule. He would never admit to his list of patients more than twelve at a time; so that he might be able to study each case fully, and devote his undivided attention to the cure.

At last, when he was upwards of forty years of age, he retired from active occupation, intending to devote the residue of his days to literary pursuits. Here, in his country-house near Dort, he thought a great deal on the subject of the soul and a future state. Christianity he rejected, as a collection of incoherent and irrational opinions; but for the person of Christ he had at first a prepossession. He thought that He was a man of sense and superior understanding, who, by opposing the ecclesiastical and political maxims of the Jews, had become the object of their hatred and the victim of his own system. However, when he again thought of Christ as claiming to be the Son of God, and professing to work miracles, he felt that he could no longer view Him with his former veneration.

"I then," he says, "prayed that God would prepare me for virtue and happiness, by punishing my sins; and I thanked Him for every misfortune. But the first observation that I made was this,—that, though I was often severely chastised, it did not make me wiser or better. I therefore again prayed that in every instance God would show me the crime for which I was punished, that I might know and avoid it. Finding this vain, I began to fear that I should never be rightly reformed in this life by punishment; still I hoped that hereafter, in some sort of purgatory, I might be finally freed from moral evil. And yet when I reflected how little punishment had as yet done to produce the lowest degree of virtue in my soul, I was forced to allow that experience was opposed to my theory, and I concluded that it was quite beyond the reach of my reason to discover the true road to virtue and happiness. I confessed this to God, and owned that I was like a blind man, who had lost his way, and who waited in the hope that some benevolent person would pass by and show him the right path. Thus I waited upon God, that He would take me by the hand and lead me in the way everlasting."

One day in the end of June 1791, and in this state of mind, he was sailing on the river near Dort with all his family,—that is, with his wife and only daughter,—when a sudden storm arose, and a waterspout bursting on the boat instantly capsized it. The doctor, clinging to the boat, was carried nearly a mile down the river; for in the fearful squall no one could venture out to render assistance. At last a vessel, which had been torn from her moorings, passed near him, and the sailors succeeded in getting him on board. When the tempest subsided and he reached the shore, he found himself, as he had feared, doubly bereaved, for he had no longer wife nor daughter.

Just as a sudden shock sometimes sobers a drunkard, so it sometimes sobers an infidel. The besotted conscience wakes, and before sophistry has time to close the shutters, some beams of truth have darted in. Van der Kemp had been on the brink of eternity, or rather he had already been over the verge: a mighty hand had intercepted him, and restored him to the land of the living. But it was no longer the same world. His home was desolate, and the earth was dark. Next Sabbath he went to church, and was much impressed by the observance of the Lord's Supper, which that day happened to be celebrated, and of which he could not refrain from partaking, notwithstanding his hitherto avowed unbelief. In much agitation he placed himself among the communicants. He felt broken-hearted, and yet constrained to acquiesce in the sovereign will of God, which had in a moment deprived him of his dearest earthly comforts. He also felt powerfully disposed to yield himself to God through Jesus Christ; and when he thought of his rejection of the Christian system, it was impressed on his mind,—"Examine it once more, and you will judge differently ; but eat now of this bread, and remember your new Master." In the afternoon he sat down, and with such composure as he could command, he began to ponder the leading doctrines of the Gospel,—more especially those which relate to the disobedience of Adam and the righteousness of Christ. According to his apprehension the New Testament account of the matter is shortly this: that the sinner is a likeness of Adam the guilty and condemned; but that through the grace of God and the intervention of God's Son, that sinner is restored to the image of the holy and glorified Redeemer, the second Adam. He then proceeded to search the Scriptures, and was amazed to find the whole truth so luminously set forth in the Epistle to the Romans. It satisfied his judgment, it overpowered his feelings, and thenceforward he received and revered the sacred Scriptures as the Word of of God, and made them his rule of faith and practice. He was a converted man.

In his own words,—"When the Lord Jesus first revealed himself to me, he did not reason with me about truth and error, but attacked me like a warrior, and felled me to the ground by the power of His arm. He even displayed no more of the majesty of a benevolent king than was necessary to compel me willingly to obey Him. But as soon as I had submitted to Him as a conqueror, He assumed the character of a prophet, and I then perceived that the chief object of His doctrine was to demonstrate the justice of God, both in condemning and saving the children of men. I was pleased to find that it had been represented to Paul in the same light, when he admired and adored. It is the justice or righteousness of God therein so evidently revealed which excites faith and conviction in the hearer."*

At this time missions were a novelty, and no missionary movement had yet proceeded from the Netherlands. But the perusal of one of the documents of the London Missionary Society produced such an impression on the mind of Dr. Van der Kemp, that he made an offer of his services to that Society. They were delighted to obtain a man of his power and fervour, and as in the Providence of God he appeared exactly the man they needed for their projected mission to South Africa, to which his own thoughts had been peculiarly directed, he was at once designated to the work along with Mr. Kicherer and others. Their ordination took place in the Scots' Church, Crown Court, in the end of 1798.

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* "Memoir of Van der Kemp," a pamphlet published at London, 1812.

Like all successful evangelists, Dr. V. was a man of extraordinary energy. He was fifty years of age before he set sail for South Africa; but, full of Christian elasticity, and enthusiastically devoted to the race whose welfare he sought, he shrank from no danger, and toil and hardship he rather seemed to invite. During his sojourn in London, passing a brick-field it struck him that a great boon might be conferred on the Hottentots by teaching them to build better houses, in order to which it would first be needful to teach them the art of brick-making. Accordingly he sought leave to join the labourers, and for some weeks the venerable apprentice sweltered among the brick-kilns, lightening his labour by the thought of Africa. And when he arrived among the people of his choice, he consecrated himself to their service with the ardour of a lover and the zeal of an apostle. Undismayed by their offensive habits, he took up his abode in the midst of them, and often without any European comfort,—sometimes without hat, or shoes, or stockings,—he not only taught their children and preached to them the Gospel, but, "labouring with his own hands," he showed them how by their own industry they might support themselves; and, as if in defiance of the prejudices of his Dutch compatriots, he threw in his lot entirely with these scorned outcasts by taking a Hottentot woman for his wife. He "was a man of exalted genius and learning. He had mingled with courtiers. He had been an alumnus of the Universities of Leyden and Edinburgh. He had obtained plaudits for his remarkable progress in literature, in philosophy, divinity, physic, and the military art. He was not only a profound student in ancient languages, but in many of the modern European tongues, even to that of the Highlanders of Scotland, and had distinguished himself in the armies of his earthly sovereign. Yet, this man, constrained by the 'love of Christ,' could cheerfully lay aside all his honours, mingle with savages, bear their sneers and contumely, condescend to serve the meanest of his troublesome guests, take the axe, the sickle, the spade, and the mattock, lie down on the place where dogs repose, and spend nights with his couch drenched with rain, the cold wind bringing his fragile house about his ears. Though annoyed by the nightly visits of hungry hyenas, though compelled to wander about in quest of lost cattle, and exposed to the caprice of those whose characters were stains on human nature, whisperings occasionally reaching his ears that murderous plans were in progress for his destruction, he calmly proceeded with his benevolent efforts; and to secure his object would stoop with 'the meekness of wisdom' to please and propitiate those rude and wayward children of the desert whom he sought to bless."*

When the labours of the Doctor and his colleagues were beginning to tell on the Hottentots, the Dutch farmers took alarm. They feared that with the progress of instruction they would lose the services of these poor savages, whom they had hitherto treated very much as beasts of burden; and their representations were producing such an effect on the respectable Dutch governor, Janssen, that he imposed very inconvenient restrictions on the operations of the mission.

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* M[illegible] [illegible] rn Africa," p. 28.

Fortunately, at this period (1806) the colony passed into the hands of the English; and under the protection of Sir David Baird, the mission so prospered, that, in 1810, the settlement at Bethelsdorp contained nearly a thousand inhabitants, all receiving Christian instruction. Mats and baskets were made in considerable quantities, and sold in the surrounding country. Salt was also manufactured, and bartered for wheat; and by sawing, soap-boiling, and woodcutting, the people exerted themselves for an independent maintenance. Dr. V., who supported himself as a missionary with scarcely any charge to the Society, spent nearly a thousand pounds of his patrimony in the ransom of slaves; and his representations to Lord Caledon were the first in a series of movements on behalf of the oppressed aborigines, which in 1828 ended in their obtaining rights and privileges in all respects equal to those of the Dutch and English settlers.

Dr. Van der Kemp died Dec. 15, 1811. Although his own exertions were not crowned with the immediate and signal success which attended some less conspicuous labourers, he may well be regarded as the greatest modern benefactor of Southern Africa. His self-consecration and the glowing letters he wrote home, stirred both Britain and the Netherlands, and infected not a few with his own affection for the Hottentots; whilst the efforts which he made for the civil enfranchisement, as well as the social and spiritual elevation of the down-trampled natives, entitle him to be regarded as the precursor of all those improvements to which Pringle, and Philip, and Fowell Buxton, and many other noble philanthropists, successively contributed, and to which the present benevolent Governor of the Cape colony is striving to give the consummation.

Situated at one of "the ends of the earth," it may be conceded that the Hottentot race had sunk down to be one of the extremes of humanity. Ignorant of all the mechanic arts, indolent, filthy, worshipping not even an idol, but a ridiculous insect, and by their task-masters browbeaten into the belief that they were no better than baboons,—heartless, hopeless, they were treated as a more troublesome, though more intelligent kind of sheep-dogs. But accosted by the gracious accents of the Gospel, even these poor abjects have begun to rejoice in the hope full of immortality, and have astonished their old task-masters and contemners by their intelligence and industry. Under the fostering wing of Christian missions, they have congregated into little villages; and the following description of one of these near Algoa Bay shows how it looked some years ago:—

"I came in sight of the village as the sun was setting. The smoke of the fires just lighted to cook the evening meal of the home-coming herdsman was curling calmly in the serene evening air. The bleating of flocks returning to the fold, the lowing of the kine to meet their young, and other pleasant rural sounds, recalling all the pastoral associations of a Scottish glen, gave a very agreeable effect to my first view of this missionary village. When I entered the place, however, all associations connected with the rural scenery of Europe were at once dispelled. The groups of woolly-haired, swarthy-complexioned natives, many of them still dressed in the old sheepskin mantle; the swarms of half-naked children; the hovels of mud or reeds; the long-legged, large-boned cattle; the broad-tailed African sheep, with hair instead of wool; the 'goeden avond' ('good evening') courteously given, as I passed, by old and young; the uncouth, clucking sounds of the Hottentot language; these, and a hundred other traits of wild and foreign character, made me feel that I was far from the glens of Cheviot,—that I was at length in the land of the Hottentot.

"Afterwards I attended the evening service of the missionary in the rustic chapel of Bethelsdorp. The place was occupied by a very considerable number of the inhabitants of the village, a large proportion being females. The demeanour of the audience was attentive and devout, and their singing of the missionary hymns was singularly pleasing and harmonious. . . . Even among the rudest of the people there was an aspect of civility and decent respect, of quietude and sober-mindedness, which evinced that they were habitually under the control of far other principles than those which regulate the movements of mere savage men. They appeared to be in general a respectable and religious native peasantry." *

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* Pringle's "Narrative," 14–17.

When the aged missionary Marsveld was taken to see a bridge near Genadendal, supported on five massive piers, and strong enough for loaded waggons to pass over, and all of it the handiwork of Hottentots, he wept. And well he might. It was a great trophy. Nothing but the Gospel could have inspirited such a people for such an enterprise. In keeping with this Lieutenant Stockenstrom states, that the land at Kat river is cultivated "to the astonishment of everybody who visits it." "At the station where I live," says a Moravian, "one half of the population subsists by working at mechanical arts,—cutlers, smiths, joiners, turners, masons, carpenters, shoemakers, tailors, and so on." And, looking at a list of various industrial productions, says Andrew Stoffel, himself a Hottentot, "we can make all those things except a watch and a coach."*

As with industry, so with morality. In three circuit tours which he made through the colony, a judge† stated that out of 900 cases before him, only two were Hottentots connected with missionary stations, and neither of these was a case of aggravated character.

Considering the many obstacles — not a few of them arising from irreligious Europeans — the success of the mission is most cheering. Towards the close of life Henry Marsveld wrote to a friend, "My strength is daily decaying; but I enjoy the presence and peace of my Saviour, and that is quite enough for me. Often do I reflect on days of old, and thank my God and Redeemer that he drew me, a sinner, into Himself, and granted me to know His love, power, and grace. He has even honoured me, who am so unprofitable, to be His servant, and has blessed my weak testimony of His death and sufferings for us. I have had the favour to baptize 415 Hottentots. It is now twenty-five years since, in weakness and poverty of spirit, we began to preach to the people here, and the Lord opened the hearts of the Hottentots, so that His saving Gospel found entrance. Many of them have departed this life with joy, in full reliance on His merits: 477 lie buried in our burying-ground." And other societies besides the Moravian can reckon numerous converts.*

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* Harris's "Great Commission," p. 197.

† The Hon. Justice Burton.

Some of these have been signal instances of God's saving mercy: none more noted than Africaner, who, from being the African Rob Roy—a free-booter, an outlaw, and a man of blood—spent his last years a meek, docile, and affectionate follower of the Lamb of God. In the experience, too, of these poor children of the desert there is much that reminds us of the records of religious biography in more favoured lands. For instance: Philip was the servant of a kind-hearted master, but he was a bad man and a scoffer. He used to jeer at his Christian countrymen, and when any one reminded him of the coming judgment and God's all-seeing eye, he would jestingly answer, "Ay, God Almighty would have a great deal to do if He took notice of everything that people do and say." But at last the hand of God arrested him. After a drunken debauch he was seized with such convictions of sin, that he could hardly rest day nor night. He suffered God's terrors and was distracted, and there was no one to guide or instruct him. One Sabbath evening he obtained leave to be present when the Scriptures were read in his master's family. One portion read was the parable of the Pharisee and Publican. As the farmer read the Pharisee's prayer, "That was a good man," thought Philip; "oh, that I were like him!" "But," as he afterwards described it, "when he came to the publican, and read how he had been justified, though he durst not lift up his eyes to heaven, but only smote upon his breast, saying, God be merciful to me a sinner, it went to my heart. Thank God, I thought, that such a wretch may find mercy. Now I have learned how a man must pray to God if he would be heard. I went immediately out of the house, and stood all that night and the following day in the fields, crying aloud in great agony, 'God be merciful to me a sinner!'" But his prayer was not instantly answered. He still wandered about carrying his heavy load of guilt, weeping, and finding no comfort. One night there came a fearful storm of lightning. Philip crept into the roof of a barn, and lay there trembling. He thought it likely that the lightning would strike him dead; and he only hoped that it would also burn the barn and his own blasted body, so that people might never know how awfully the scoffer had been punished. But the storm passed over; and, next morning, creeping out to a solitary place, Philip renewed his earnest cry, "God be merciful to me a sinner!" "Suddenly," as he related it, "as it were a sunbeam from heaven shone into my soul, and with it an assurance that God would forgive me my sins. I was overwhelmed with joy, and poured out my heart in thanksgivings, desiring to tell all mankind that my prayers were heard; and, as none were present to hear me, I called aloud to the trees standing before me: 'O ye trees, ye bushes, ye plants, ye flowers, yea, all the grass, thank and praise God with me, for He has forgiven me my sins!" When he had learned the way of God more perfectly, it is interesting to know that Philip's conversations were, in turn, made useful to his kind-hearted master.

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* In this paper we have confined our account to the Hottentots. The South African mission now includes the various Kaffir and other tribes. Amongst these the missions of the Free Church of Scotland number 298 communicants and 449 scholars.

We have been struck and edified by some of the ingenuous utterances of these poor people in conversation with their teachers. "Do you love the Saviour with your whole heart?" said the missionary to a young man. "No, not with my whole heart. One-half is directed towards Him, but the other towards fine clothes, horses, and oxen." "I am a shepherd," said another, "and when I am alone, minding my sheep, I frequently think of our Saviour, as He represents Himself as the Good Shepherd. When one of my sheep runs away, and I am following it, I think, Thus did I run away, and my Saviour followed me to save me from the danger of perishing in the desert." "I cannot speak with you now," said a Hottentot woman, "for my heart is like a piece of land over which the torrents have burst, and covered it with sand and rubbish, till the good ground is no more visible. But I will not cease praying till our Saviour remove the mass of sand, and discover again the good ground he had given me."*

Very remarkable, too, and to some of us very reproving, are their simple trust in God and ready recourse to prayer. Jacob Conrad was on a journey with his son. They had no provisions, and by-and-by the son grew hungry and complained. "Never fear," said his father, "the Lord will take care of us." And sure enough, soon afterwards they found lying on the road a piece of bread sufficient to assuage their hunger, for which they both gave thanks to God. In a meeting of communicants one of them said, "When I consider the kind care of my heavenly Father, in the years of scarcity, I must still weep for joy. A farmer owed me some corn. I got one quarter of the measure, and when it was finished, and I went back for more, he turned me out of the house very angrily, and told me never to come to him again. I went away, and spent the night in the fields without food. I cried to the Lord: 'Lord Jesus, thou knowest that my wife and children are without food, and thou alone canst help me in this distress. Turn thou the heart of this man, that he may give me my corn.' Early in the morning the baas (master) came to me, and said, 'Come, Hottentot, and bring your sack with you.' He now put so much corn into it, that I was obliged to say, 'Stop, baas, or my little horse will not be able to carry it;' on which he told me, that when I needed more I should come again, and he would give me as much as I wanted." H.

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* "Missions in South Africa," p. 102.

DIVINE THOUGHTS *IN* THE FACTS OF CREATION.

We now turn from our own planet, to—

II. *The Planetary System.*

According to the present findings of astronomy, that system consists of the sun, its centre, and eight large planets, besides many smaller,* varying in magnitude, distance from the centre, and velocity of movement, but all spherical in form; having a motion on their own axis and another around the sun, moving in one direction from west to east, and nearly, but not exactly, in one plane, and tracing in their orbit an ellipse, more or less approaching to a circle. Within the primary system, there are what are called the secondary systems, consisting of the satellites of the planets, the Earth having one, Jupiter four, Saturn eight, Uranus six, and Neptune one. If we may judge from our moon, respecting the rest of these bodies, they have three distinct motions: first, on their own axis; second, around the planet to which they belong; and third, along with their planet, around the sun. Besides these, there is yet another class of bodies belonging to the solar system, in many respects widely distinguished from the planets and their satellites, viz. comets. Their substance is thin, luminous, and sometimes transparent. They are not confined to any plane in their orbits, but are found in all parts of the heavens. Their path, however, is elliptical, and they are governed by the same great law, as the other parts of the system. At the same time the ellipse which they describe, instead of approaching to a circle, as it does in the case of the planets, is indefinitely long and narrow. The number of the comets is supposed to be very great, and already several hundreds have been distinguished. It may serve to show the exactness and certainty which belong to the vast solar system, if we here notice that the time of the appearance of some of these least legalised parts of it can be calculated precisely. The comet called after Halley occupies seventy-six years in its revolution, and its reappearance has been predicted and verified exactly. This is true also of the comet called after Encke, which makes its circuit in less than four years. The ancient saying, "God works by Geometry," finds a wonderful interpretation in the planetary sphere. No mathematician ever displayed such perfect exactness, such unerring accuracy, as are exhibited in the movements of the solar system. Such an event as an eclipse of the sun or moon can be predicted to a day, even to an hour, years,—any number of years, before it takes place. Or the calculation may be retrospective, and it may be infallibly pronounced when, ages ago, such an event occurred. The father of history relates that Thales predicted the eclipse of the sun which happened during a battle between the Lydian king Abyattes, and Cyaxares the king of Media, and which had the effect of stopping the battle and leading to a peace.* There are some difficulties connected with the chronology of this fact which need not here be introduced. Suffice it to say, that the historian has been marvellously authenticated by the mathematician. The period of the battle, it is established on independent grounds, was about 610 before Christ. And calculation makes out that on the 30th of September, in that year, there occurred a total eclipse of the sun. A system in which, though relating to the greatest magnitudes and distances, such perfect and infallible accuracy is secured, can be nothing else than a thought-product,—the *outcome* of an intelligence to which no limit can be affixed.

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* The ascertained number of planetoids, between Mars and Jupiter, is thirty-five.

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* Herodotus, i. 74.

The region into which we have entered exhibits magnitudes, and distances, and velocities, which, though we can determine, we cannot comprehend, and opens out to a vastness which confounds and overwhelms.

The globe we inhabit is eight thousand miles in diameter, twenty-four thousand in circumference, and ninety-five millions distant from the sun. Two of the planets are smaller than our Earth, Mercury being two-fifths, and Mars half its size. Venus is nearly of the same magnitude. Jupiter, the largest of all the planets, is eleven and a half times larger than our Earth, four hundred and ninety millions of miles distant from the Sun, and takes twelve years to accomplish his circuit. Saturn is less than Jupiter, but is nine hundred and six millions of miles distant from the Sun, and takes thirty years to accomplish his circuit. Uranus is about half the size of Jupiter, but is eighteen hundred millions of miles distant from the Sun, and takes eighty-four years to accomplish his circuit. Neptune is larger than Uranus, being six and a half times the size of our Earth. He is two thousand nine hundred millions of miles distant from the Sun, and takes a hundred and sixty-seven years to accomplish his circuit. But the Sun is not far short of one million and a half times the size of our earth, so that if all the planets of the solar system were united into one, they would form only an insignificant fragment compared with his enormous magnitude. It is found that the Sun has a movement on his own axis, which he accomplishes in something more than twenty-five days. If our Earth, making one revolution on its axis, travels at the rate of a thousand miles an hour, the Sun, making one revolution on his axis in twenty-five days, must travel not far short of sixty millions of miles in an hour—a velocity this which we may put down in figures, but which defies all conception.

Except by the motion on his axis, the Sun's place in the heavens is unchanged, or if changed (as is now generally conceived) the change is inappreciable by all human means of discovery. He is the *fixed* centre of a mighty system. In space, to us illimitable, in empty space that prodigious sphere, thirty-four thousand millions of miles in circumference, is flying on his axis at a rate of speed not far short of sixty millions of miles in an hour. By what is his axis fixed and rendered immovable? An original projectile force, though its enormous amount overwhelms thought, would account for his motion on his own axis, but not for that axis being stationary. Why does he not fly off, in his stupendous whirl, into boundless space, dragging the planets along with him? What controls, what retains him, that so far as we know he moves on a point, and that point fixed through ages? If his attraction keeps the planets in their orbits, as we know it does, their attraction, inasmuch as their united masses constitute but a minute fraction of his magnitude, cannot control him. If we anticipate for a moment what belongs to the theory of the wider starry sphere, and suppose that the solar system is but a unit in a vast sum, and that the power and capabilities of the unit arise from its position in that sum; if we say that the Sun and all his planets form but a single star in the magnificent firmament, and that that star is acted on by the mightier attractions amidst which it is placed, and out of the combined and complicated forces of all of which results a perfect and universal harmony,—do we not, by the very same token, take refuge in the region of almost pure thought? More and more we are forced to interpret *material* difficulties and contradictions, which would otherwise for ever multiply upon us, and be otherwise irreconcilable, by resolving them into *ideas*. That centre of the solar system, whirling in empty space, yet fixed and immovable, can be taken in by us, grasped by our understanding only as a thought—a beautiful, grand, sublime thought—which commends itself to our reason, because it is a product of reason, that reason which is in us, but is also over all.

The Sun is the central force governing, in consequence of his enormous magnitude, the movements of the lesser planets. He is also, as we have seen, the fountain of light and heat,—he alone is the fountain. Many other arrangements were possible. One or more of the planets might have been luminiferous and the central sphere opaque. One or more might have been masses of fire, and the Sun and the other planets dependent on them for heat. It can be shown that from these or any such varieties of method, certain imperfections and certain evils to organised beings were inseparable. It can be shown, that the existing economy is the most perfect conceivable, securing alike uniformity, regularity, permanence, and universality of distribution. That the centre should be the one source of illumination and of warmth to the system, commends itself at once to reason; and the more extensively and severely it is investigated, it is found to be ever the more profoundly wise and the more perfectly adapted to all the conditions. But it was *an idea* before it became *a fact*,—it *is* a Divine idea expressed in the language of fact. QUÆRENS.

MRS. SHERWOOD.

The perusal of the "Life of Mrs. Sherwood" has strongly confirmed us in an opinion long since formed, that the *inventive* faculty is not so extensively bestowed as is often supposed, but that in the most successful works of fiction (so called) it is rather the power of grouping well together the remembrances of childhood and the experience of later days which tends to produce popularity. Perhaps this is true in a certain degree with regard to Poetry, Painting, and Music; for while there are few who can appreciate the higher flights of pure imagination, there are many who are affected even to tears by the simple versification of home thoughts, or the landscape of which every feature may be traced in some familiar scene, or the touching ballad which calls up in all their freshness bygone thoughts and feelings.

But our business is at present with Mrs. Sherwood and her Autobiography; and in this volume it is most interesting to trace the originals of many of those characters which, by her numerous tales, have become so familiarly associated with our nursery days or our school-girl reminiscences. With the latter class our authoress was an especial favourite, partly, perhaps, because, in consequence of the frequent interweaving of romance with religion which appeared in many of her stories, more of the forbidden fruit was found there than could usually be met with in a schoolroom library. Certainly all tastes might be suited, for the same volume would often present by turns a grave sermon and a highly-wrought novel, and some of our readers may still remember in what proportion these were severally received and digested.

Of Mrs. Sherwood's birth and parentage little need be said, for tables of genealogy are by no means interesting to the "general reader." But over her education we must not pass so lightly, for by no ordinary training was she fitted for a life of many and strange vicissitudes. Her parents appear to have been persons of respectable descent and refined minds, but were strikingly contrasted in natural temperament: the father all kindliness and large-hearted benevolence, with a smile for every fellow-creature he met, whether gentle or simple, old or young; the mother with a strong tinge of constitutional melancholy, shrinking from the most distant approach of what was coarse and uneducated. In personal endowments, too, the difference could hardly have been less apparent. The Rev. George Butts must have been a man of attractive exterior, while his wife, we are told, was "a very little woman, having a face too long in proportion, with too decided features. She was marked, too, with the small-pox, and had no personal beauty but in her hands." A truly Daguerreotype portrait. She had been the intimate friend of a lovely young woman to whom Mr. Butts would have been married, had not an untimely death prevented their union, and it was in obedience to parental wishes that he next turned his thoughts to Miss Martha Sherwood. That a very tender feeling for the departed friend of their youth lingered in the hearts of both we may gather from the fact, that her name was bestowed, in conjunction with that of the mother, on their eldest girl, who was baptised as *Mary* Martha.

And thus "into this world of many changes," our authoress tells us, she was introduced on the 6th of May, 1775. At that time her father was residing at his living of Stanford, in Worcestershire, where truly "the lines had fallen to him in pleasant places." Very tempting is the description given of the Rectory and its surroundings. "Few have travelled farther, or perhaps seen more than I have; but yet, in its peculiar way, I have never seen any region of the earth to be compared with Stanford. The parsonage-house commanded four distinct views from the four sides, and so distinct, that it was difficult to conceive how these could have been combined in a panorama. On the front of the house, towards the west, a green lawn, with many fair orchards beyond, sloped down to the bed of the Teme, from which arose, on the opposite side of the river, a range of bold heights richly diversified, at a distance so considerable as only to show its most pleasing features, such as copses, farm-houses, fields of corn, villages with their churches, and ancient mansions. The hills of Abberley and Woodbury terminated the view: the one being celebrated for the encampment of Glendower, and the other for Abberley Lodge, the seat of William Walsh, the friend of Addison, and supposed by some to be the place wherein was written the fine old character of Sir Roger de Coverley, though this I have heard disputed in later years. On the south, my father's house looked over Sir Edward Winnington's park, to form and adorn which a whole village had been sacrificed; whilst Broadway and fair Malvern gave their beauties to the scene, separated from us only by the silver Teme, which near that spot empties itself into the river Severn. The hills and lands, on the east, were so richly wooded that the country partook there more of forest scenery than aught else I could name, neither were waterfalls wanting; whilst, on the north, we had orchards of fruit-trees and cultivated fields, presenting altogether such regions of varied beauties, that my eyes, as I said before, have never seen the like since."

Thus rich and varied were the charms of the outward world, while within, the parsonage seems to have been well stored with books and pictures, which in due time exercised a strong and lasting influence on the child's opening mind. Her brother, an imaginative boy, scarcely more than a year older than herself, was the companion of many a pleasant ramble and fire-side book. Together they read "Robinson Crusoe," "Fairy Tales," and "Æsop's Fables;" together they made their first essays at juvenile composition, their fond father persuading himself that both were *geniuses.* Perhaps it is best to sum up in her own words the impression made upon her mind in later life by a retrospect of this period.

"It was the fashion then for children to wear iron collars round the neck, with a backboard strapped over the shoulders: to one of these I was subjected from my sixth to my thirteenth year. It was put on in the morning, and seldom taken off till late in the evening; and I generally did all my lessons standing in stocks, with this stiff collar round my neck. At the same time I had the plainest possible food, such as dry bread and cold milk. I never sat on a chair in my mother's presence. Yet I was a very happy child; and when relieved from my collar, I not unseldom manifested my delight by starting from our hall door, and taking a run for at least half-a-mile through the woods which adjoined our pleasure-grounds."

We have surely extracted enough to prove that buoyancy of spirit was one of the marked characteristics which, thus early developing itself, proved in after-life so great a solace in trial and help in duty.

Meantime the worthy Rector of Stanford had been appointed, in 1784, one of the chaplains-in-ordinary to his Majesty George III., and the visits which, in the exercise of his official duty, he paid to London in the month of November, afforded a rich store of amusing and courtly anecdotes to the quiet circle at home. We are scarcely justified, perhaps, in such a description of the family party at the parsonage after the introduction among them, as an inmate, of a certain Madame de Pelivé, a distant connexion, who, having been with her husband in Paris during the outbreak of the Revolution, returned to her native country straitened in circumstances, and glad to accept the hospitality of the English parsonage. We cannot resist the temptation of giving an account of her arrival at Stanford, bearing in mind the character already given of the lady at the head of the household: —

"She arrived in a post-chaise, with a maid, a lap-dog, a canary-bird, an organ, and boxes heaped upon boxes, till it was impossible to see the persons within. I was, of course, at the door to see her alight. She was a large woman, elaborately dressed, highly rouged, carrying an umbrella, the first I had seen."

At this time, if we may believe her own description, Mary Martha Butts was "a tall, unformed, awkward girl, with very long hair and very rosy cheeks," just the sort of raw material, in short, a woman like Madame de Pelivé would delight to encounter. While the lively lady was adorning the young head with a "gauze cap of a very gay description," its internal furniture was receiving considerable additions by access being granted to a new store of books, containing several romances, Sir Philip Sidney's "Arcadia" and many volumes of the Fathers; the "Travels of George Sandys," too, were among these treasures, all, doubtless, contributing their share toward the formation of her habits of thought.

But in her thirteenth year the happy Stanford home was exchanged for one far less attractive. The family removed to the valuable living of Kidderminster. Here, as elsewhere, the benevolent heart of the pastor found ample means of gratification; while his more timid wife, finding little that was congenial in the companionship afforded by a manufacturing town, withdrew herself more and more from intercourse with the world, and spent her days in vain lamentations for the lovely retirement she had left, till her health completely gave way. We must pass hastily over Kidderminster life, and open the page of our authoress's school history, one which certainly could find no parallel in our own days. The scene is now removed to Reading, where, in 1790, Mr. Butts accompanied his old friend Dr. Valpy to see a sort of exhibition got up by the young ladies of M. and Mme. St. Q.'s school. "My father was delighted with all he saw there. This, he thought, is the very place for Mary."

And Mary was accordingly placed under the charge of these somewhat unusual teachers. We do not exactly perceive what is meant by her observation, "I believe he was divinely directed in his choice," for certainly we should not think the *régime* adopted there the best calculated to form a valuable female character. Scarcely less changed is the outward aspect of that school's immediate neighbourhood than the routine of education which would now be pursued within its walls. The Forbury at Reading was an open green around which the Abbey School (with which we are now concerned), and other considerable houses stood, surrounded by old-fashioned gardens. Where are those gardens now? The railway-station stands on the very borders of the green, the splendid gaol occupies a part of the very ground on which the ruins of the Abbey stand, the not very inviting words 'To let' appear in the windows where once those merry young pupils might be seen, while a peep obtained through a crazy gate at the back reveals a garden going rapidly to decay. The house itself was connected with the Abbey-gate, in the turrets of which were little nooks and passages, which must have been a perfect treasure-house of mystery to the more romantic of the young ladies. The broken windows look desolate enough now, and, in "this world of many changes," the Forbury at Reading has shared the common lot. But, in 1790, its history must have been stirring indeed. The heads of the establishment were by no means common characters. The teachers,—who shall describe them but our authoress herself? "The three teachers sat round the fire; each had on, what was called in those days, a close cap, that is, a large muslin, rather blowsy cap, which was to hide black pins, curl-papers, &c., &c., the rest of their dresses being equally indicative of some domestic bustle. . . . The first was a little simpering English woman, very like a second-rate milliner of these days; she taught spelling and needle-work. The second was a dashing, handsome, rather slovenly French girl, who ran away with some low man a few months afterwards. The third was, I think, a Swiss, and though plain and marked with the small-pox, had some good in her, I apprehend; but I had not the wit then to find it out." Little enough seems to have been required of the first-class young ladies in the way of study. After an hour or two with their tutor in the morning, they were left to amuse themselves in their own way. "Whether we gossipped in one turret or another; whether we lounged about the garden, or out of the window above the gateway, no one so much as said, 'Where have you been, mademoiselle?'"

After a year's sojourn at Reading Abbey, Mary Butts was joined by her sister Lucy, to whom she seems to have been through life most warmly attached. It was an eventful time. French troubles were at their height. Louis XVI. had fallen a victim to popular fury, and many of his attached followers among the *haute noblesse*, had found an asylum amongst sympathising friends at Reading. Of course the foreign connexions of M. de St. Q. made his house a rendezvous for them. "Amongst them were several single, and some married men, who were always about the house during the day, and very frequently came to supper in the evening." Then followed, in the French style, a strange medley of Royalist tears and theatrical entertainments, in which Mary Butts bore her part, occasionally botanising with an abbé, who strove to win her over to the Romish faith, at others listening to the dangerous flatteries of the fascinating courtiers. In all this there must have been more of education than of instruction; and such a state of things could scarcely fail to bring out all the folly that was bound up in the hearts of these poor girls, thus prematurely exposed to the world's temptations.

Soon after her finally leaving school, Mr. Butts returned with his family to the Stanford home, but over that place of "sunny memories," a cloud of sorrow was soon to pass which forever changed its aspect. Affliction weighed heavily on the occupants of the hall, and erelong it reached the once joyous parsonage. The beloved rector was removed by a stroke of paralysis, and the widow and children sent forth to seek another resting-place. Again the morbid melancholy of Mrs. Butts' character appeared, and her choice of a new home seems almost to have been determined by a pre-eminence of discomfort, which a cold and forlorn house in Bridgenorth appeared to possess. A description of it, which would have sufficed to deter most people from further negotiation, fixed her choice in its favour, and to a house in the High Church Yard accordingly the mother and daughters removed in the spring of 1796. What a change for the sisters! They employed themselves as cheerfully as they could in reading and writing, and during their brother's long vacation Mary studied Greek with him, and was soon put into Homer. A new source of interest opened for them in the charge of a Sunday-school, in which they worked assiduously, and we may hope in some measure successfully, though there is no reason to believe that at this time any considerable amount of religious knowledge was possessed by either. "We made bonnets and tippets for our girls; we walked with them to church; we looked them up in the week-days; we were vastly busy; we were first amused, and next deeply interested."

But erelong a visitor was received at the dull house in the High Church Yard, who was at a future period destined to alter entirely the lot of one of the sisters, and whose biography becomes interwoven with her own. Want of space alone prevents our transcribing portions of Henry Sherwood's life (in itself a perfect romance). Almost self-educated, his history presented a succession of remarkable vicissitudes. While his father, a violent Republican, residing in France, was wholly given up to politics, and his stepmother leading an invalid life in her chamber, the boy was left entirely to his own devices. At one time serving on board a French gun-boat; at another, lodging with a poor washerwoman at St. Vallery; then confined with fifty of his countrymen in a French prison; next, escaping with his parents to Geneva, and there living in strict retirement and poverty dependent upon the kindness of friends, he at length, through a succession of hair-breadth escapes, made his way to England, and presented himself before a blind and aged aunt, who kindly received the young wanderer, and restored him to more influential relations. It was during the visit to Bridgenorth, of which we have spoken, that he was induced by a military friend to enter the army, and, having returned in 1803 from foreign service, he addressed from Hilsea Barracks a letter to his cousin, Mary Butts, which issued in their marriage some months later. It was on the last day of June that she assumed the name by which she will long live in the hearts of English children; and we are led thus from the contemplation of her "maiden to her married life."

A few incidents connected with it may form the subject of a future paper. A.

LIFE, IN ITS HIGHER FORMS.

No. V.

MAMMALIA.

BY universal consent, those animals which we generally call Quadrupeds are placed in the highest rank of organic life. Perhaps it would be scarcely true to say that a Guinea-pig or an Ant-eater is superior in energy and development to a Falcon, superior in those characters which determine relative rank in being; but this only shows—what we have had repeated occasion to state—that the range of animal existences cannot be included in a linear series. The Ant-eater and the Guinea-pig are members of a great group of creatures, which are manifestly associated together by a closer bond than that which allies them, or any one of them, to other creatures; and this great group possesses, as a whole and characteristically, though in degrees differing *inter se*, the various senses, powers, and faculties, both bodily and mental, that belong to an animal in a higher state of development, than any other equivalent group.

The term "Quadruped" is applicable to this Class, not in scientific strictness, but only in popular freedom of speech. One whole Order—that of the Whales and Dolphins—is entirely destitute of the hinder pair of limbs, and the external form of their body is fish-like, as are also their habits of life and the medium in which they reside; yet these animals have far greater and more important affinities with Quadrupeds than with Fishes, and must therefore be grouped with the former rather than with the latter.

The term "Mammalia," derived from *mamma* (the female breast), suggests a character of great physiological value and of invariable application, by which the creatures of this Class are distinguished from all others. *They suckle their young*, which are in all cases brought forth alive (*i. e.* not inclosed in eggs), and are nourished for a time with milk, a fluid secreted in the body of the female parent.

As, with the trivial exception of the Bats, which flutter in the air, the sphere of this Class is the solid earth or the dense water, the provisions for that energetic respiration and for that high temperature of the blood, which are necessary for Birds, are wanting here. In other respects, however, the respiratory and circulating systems do not essentially differ in the two classes.

The jaws are, almost invariably, furnished with *teeth*, which play an important part in the economy of the animal, being intimately associated with its sustenance. They are solid pieces of bone covered with a much harder substance called enamel, which grow out of sockets in each jaw. They are placed in single series, and vary much in form, according to the nature of the food which sustains the animal, as well as according to their position in the mouth. In Man, there are in each half of each jaw two front teeth with a chisel-like edge, called Incisors, or cutting teeth ; one more pointed, called the Canine, or Dog-tooth, or sometimes Eye-tooth ; two somewhat flattened at the top with single fangs, called False Molars ; and three behind all with compound fangs, and broad, somewhat hollow surfaces, called True Molars or grinders. In those races which feed exclusively on flesh, the molar teeth partake of a cutting character, while in those that subsist on grain and herbage, the molar or grinding structure prevails throughout the whole. Sometimes the incisors are curiously developed ; in the Squirrel, Rat, and similar animals (RODENTIA), they project forwards in a curve, meeting at an angle, and are continually growing ; in the Elephant they stand out in the form of huge curved tusks, and in the Narwhal one is commonly undeveloped, while the other grows into a long spirally-twisted straight tusk like a horn in front of its head. The Whale has no teeth, but a series of horny plates, parallel to each other, depends from the upper jaw, and constitutes the valuable substance called whalebone. In the Ant-eaters, and some others of the EDENTATA, there are no teeth at all, while the Armadillo has ninety-six, and some of the Dolphins have a hundred and fifty.

Considerable variation, suggesting diversity in function and habit, is also found in the forms assumed by the extremities. The Carnivorous tribes, the Rodents, and some others, are furnished with paws, divided into toes, which are terminated by claws ; and thus their feet are not only supports in walking, but are endowed with a grasping, tearing, or scraping power. On the other hand, the feet of the Thick-skinned and Ruminant tribes are encased in solid hoofs of horn, which may be single, as in the Horse ; double, as in the Sheep ; three, as in the Rhinoceros ; four, as in the Hog ; or five, as in the Elephant. A hoofed foot can never be anything else than an instrument of locomotion. In the Apes and Monkeys, the feet become *hands ;* all of them having a thumb set on a different line from others, and susceptible of being opposed to them, whereby the prehensile power is immensely increased, and the capabilities of the organ are greatly varied.

In all these cases, all of the extremities are of the same form, but there are some in which the fore and hind feet differ from each other. Thus, in the Bats, while the hind feet have five short clawed toes, the fore ones have the first four fingers immensely lengthened, like the ribs of an umbrella, across which a delicate membrane is stretched, and thus the fore limbs become organs of flight. And in

Man, who by his organic nature comes into this Class, the feet are merely fitted for walking, while the anterior extremities, forming hands incomparably more delicate and more versatile than those of the Apes, are capable of executing by their skill or power the wonderfully various requirements of his reason. Finally, the anterior members of the Whales, which, as has been already observed, are all that they possess, are mere swimming fins, the bones of the toes being imbedded in a dense and leathery skin, which reveals no trace of their individual form or division.

The body of the MAMMALIA is covered more or less densely with *hairs*, which, if less elaborate and complex than the feathers of Birds, are still interesting in their structure. A hair is a long pointed cylinder of horny substance, formed within a minute cavity on the surface of the body, and growing by continual additions to its base. The cavity is lined by a reflection of the common skin, and contains a vascular pulp well supplied with nerves and blood-vessels. From the surface of this pulp the horny substance of the hair is secreted, which, perpetually increasing from below, pushes upward the portion already formed, and thus increases in length.

"Various are the appearances," observes Professor Jones, "and widely different the uses, to which epidermic appendages, in every way analogous to hair, both as relates to their composition and mode of growth, may be converted: the wool of the Sheep, the fur of the Rabbit, the spines of the Hedgehog, the quills of the Porcupine, the scaly covering of the Manis, and even the armour that defends the back of the Armadillo, are all of them but modifications of the same structures, adapted to altered conditions, under which the creatures live. Even the horn upon the snout of the Rhinoceros is but an agglomeration of hairy filaments, formed upon a broad and compound pulp. The nails and claws that arm the fingers and toes, the corneous sheath that invests the horns of the Ox and Antelope,—nay, the hoofs of herbivorous quadrupeds, are all epidermic secretions from the vascular cutis, or, in other words, are hairs altered in their form and extent, according to the exigencies of the case."*

Many of the hoofed Quadrupeds are armed with horns, which differ greatly in structure from those of the Rhinoceros and the Ox. Those of the Deer family, whether palmated like those of the Elk, branched like those of the Stag, or simple like those of the American Roes, are annual growths of bone, which are shed and renewed periodically. In an old well-antlered Hart, a "Stag of ten," such as our old poets delight to describe, the process of renewal is one of amazingly rapid energy. In the spring the bony knobs on the skull, covered with skin, begin to swell, tides of blood rush to the head, and great heat and tenderness characterise the prominences. The arteries deposit bone with great rapidity, and the budding-horns grow daily, still covered by a vascular skin, which is, indeed, a tissue of blood-vessels. The skin is covered with a dense short hair, which is technically called "the velvet."

At length the horns, with their branches and antlers, are fully formed, and are still covered with this velvety skin, which is highly sensitive. The arteries now begin to deposit a rough ring of bone around the base, with grooves, through which the great arteries pass. Gradually these grooves are filled up with bony matter, and the arteries, compressed by the constantly added matter, transmit less and less blood to the "velvet," until at length the latter receives no more. It now dies for lack of sustenance: shrivels, dries, and peels off in shreds, or is rubbed off by the animal against the trees and palings. The horns are now no longer sensitive, but can be used as effective weapons of offence. After a time, however, the thick ring of bone begins to be absorbed, particle by particle, and the absorptive process goes on until a complete separation of the horn is effected, which then falls off by its own weight from the basal prominence. The latter is presently covered with skin, and awaits the return of spring to bud anew.

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* "Outline of Anim. King.," p. 688.

The geographical distribution of animals is a subject of great interest to the naturalist; that is, the manner in which we find particular species either spread over considerable portions of the world, confined to small tracts of country, or appearing in remote but isolated regions. No country affords more interesting phenomena connected with this subject than the continent of Australia with its circumjacent islands. Excluding the Seals and Whales of its coasts, the Mammalia, known to inhabit this great region,—as large as Europe,—amount to about a hundred and twenty species, the whole of which are absolutely confined to it. Of these about a hundred are marked by some remarkable peculiarities of structure, which have induced zoologists to separate them from all other MAMMALIA, forming them into a Subclass by themselves, under the name of MARSUPIALIA. In order to appreciate the importance of these facts, we must look at the part which this Sub-class plays in the zoology of other parts of the world. The total number of terrestrial Mammalia known may amount to about 1700 species, of which 137 are Marsupialia. The facts will be better seen if placed in juxtaposition, thus:—

The Australian region contains..	120	terrestr. Mammalia.
,, ,,	100	Marsupialia.
The whole world besides contains	1580	terrestr. Mammalia.
,, ,,	37	Marsupialia.

Thus we find the Marsupial Mammalia almost confined to Australia, and Australia almost confined to them.

The most obvious peculiarities which distinguish these animals, and which have conferred upon them their scientific designation, are the immature condition of the young at the time of birth, and its reception into a pouch (*marsupium*) or fold of the skin on the abdomen of the female, in which it is protected from exposure to the air and injury; while, suspended from the teat, to which it is very early attached, it gradually assumes the form of its adult condition, and acquires the powers necessary for its independent existence. For some time, however, after it is able to procure its own living, and to run and play by the side of its mother, the young Marsupial instinctively flees to the maternal pouch for protection on the approach of danger.

But besides these more obvious peculiarities, there are others scarcely less important, which are recognised by the comparative anatomist. Diversities in the reproductive organs, in the arterial system, and in the structure of the brain; the open condition of the skull, the bones of which remain permanently separate; the tendency to a multiplication of the teeth; the presence of marsupial bones in the skeleton, even where the *marsupium* itself is not developed; and the absence of a true voice,—all manifest a departure from the high development of the placental MAMMALIA, and an approach to that of the oviparous VERTEBRATA in general, and to that of the REPTILIA in particular.

This affinity with REPTILES is most marked in two very singular little animals, the *Echidna* and the *Ornithorhynchus*. They are the lowest forms of MAMMALIA, displaying some points of similarity to Birds, but more to the Lizards, especially in the structure of the sternum or breast-bone, of the shoulder, and of the limbs generally. The latter in particular, known as the Duck-bill, caused no little astonishment, and even suspicion, among zoologists, when the first specimens were sent from New Holland to Europe. Here was a four-legged animal, covered with hair, but having the feet webbed like a water-fowl, and furnished with a beak, closely resembling that of a duck! For a long time it was believed that the reproduction of this most anomalous creature was by means of eggs; but it is now ascertained to produce living young, which are suckled like those of other quadrupeds. Mr. G. Bennet has described, in a very interesting Memoir,* the habits of life of these curious creatures.

Few as are the members composing this Sub-class, they include what we may consider as the parallels or representatives of most of the Orders of the typical MAMMALIA. Thus the Opossums in their opposable thumbs, seem to represent the Monkeys, the little *Myrmecobius* the Shrews, and the Kangaroos the *Ruminants*; while more strongly drawn analogies exist between the *Dasyuri* (the "Zebra-wolf," "native-devil," &c., of the Australian colonist) and the *Carnivora*, between the *Phalangistæ* and *Petauri*, and the *Rodentia*, and between the Duck-bill and Spiny Ant-eater, and the *Edentata*.

The largest and most attractive, as well as most valuable animals of this Class are the Kangaroos (*Macropus*). Every child is familiar with its elegant taper figure, its gentle deer-like face, its short fore-feet dangling at its breast as it stands erect on its long and powerful hind limbs and its immense tail. There are few, moreover, who have not read of its singular mode of progression, by vast leaps, through the Australian *scrubs*. Its flesh is excellent venison, and the European settlers hunt it with hound and horse. Mr. Gregson describes in a graphic manner a fine run of eighteen miles, performed by an old *boomer*, as the Great Kangaroo is called, and adds the following more general notes of its habits, with which we dismiss the MARSUPIALIA:—

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* "Trans. of Zool. Soc.," vol. i. p. 229.

"We did not measure the distance of the hop of the Kangaroo; but on another occasion, in which the boomer had taken along the beach, and left the prints in the sand, the length of each jump was found to be fifteen feet, and as regular as if they had been stepped by a serjeant. When a boomer is pressed, he is very apt to take to the water, and then it requires several good dogs to kill him; for he stands waiting for them, and as they swim up to the attack, he takes hold of them with his fore-feet and holds them under water. The buck is very bold, and will generally make a stout resistance; for if he cannot get to the water, he will place his back against a tree so that he cannot be attacked from behind, and then the best dog will find him a formidable antagonist. The doe, on the contrary, is a very timid creature, and I have even seen one die of fear."*

P. H. G.

LINES ON EGYPT.

EGYPT!—thou wonder of the primal age,
In the Nilotic valley, long ago,
The priest of Ammun,—the Memphitic sage,
Inscribed the preface to what man may know
Upon thy granite obelisks—in tombs
Where mummies, relics of thy great ones, lie:
In the stupendous pyramids, whose rooms
Abysmal, cavernous, may time defy.

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* Gould's "Mamm. of Austr."

Whence were thy people, Egypt ?—whence the might
And wealth of Menes, the first Theban king ?
Who taught thy sacerdotal class to write
In hieroglyphics ? Did their knowledge spring
From ancient Meroe ? Was the light that shone
Upon thine orient, in the morn of time,
Kindled by Hermes ?—or a radiance thrown
Into thy valley from some western clime ?
Who shall resolve these riddles ? who collate
Thy fables, and translate them into truth ?
Who place thy unplaced kings, or give the date
Of those who reigned when Saturn was a youth ?

That thou in age wast hoary, the long range
Of temples, tombs, sarcophagi, declare ;
And thy vast superstitions, vile and strange,
Proclaim Idolatry grown dotard there.

Instructive lesson ! Time developes mind,
And nations, by the lapse of years, grow wise ;
But, God unknown, the human mind is blind,
And reason sinks in her attempts to rise.

God is unknown to reason ; ye might gaze
On *Phra*, your sun-god, till the eye would be
Confused and cloudy ; but as through a haze,
Or darkened glass, his texture ye might see ;
So, God of Hosts, the soul may gaze on Thee.—
Jesus REVEALED, *yet* VEILED—*the Deity.*

J. W. (Ohio.)

EGYPT: ITS ARCHITECTURE, SCULPTURE, AND PAINTINGS.

In continuation of the interesting subject—the analogy between the metaphorical expressions of the Sacred Writings and the metaphorical sculptures of Egypt—we must refer back to a former engraving.* It represents a restoration of the propylon or gate of the Temple of Luxor on the eastern or right bank of the Nile. This celebrated ruin of ancient Thebes is in a state of excellent preservation, though the lower portion is buried in the accumulated rubbish of the modern village. For the purposes of our illustration we have thought proper to remove the accumulation from the base of the towers, and to restore to its place, on the left side of the gate, the Obelisk now in the Place de la Concorde at Paris. We have also uncovered the sphinxes of the great avenue which extends from the front of this Temple, to the side entrance of the Temple of Karnak, a distance of about 2500 metres. To make our restoration complete, we have inserted into the four grooves in front of the towers the tall flag-staffs which were held or affixed by means of certain contrivances projected out of the square perforations, to be seen precisely above the grooves. These grooves, and holes or chambers, are invariably found in all the towers of the propyla that flank the entrances to the temples of Egypt, whether of the period of the Pharaohs or of the Greek kings. The chamber passed right through the tower from the front to the back, whereas the grooves were only on the front. That the purpose of the chambers and grooves was for fixing the flag-staffs we learn from representations on the walls. Still better to transport the imagination of our readers to the spot, at the time when the metaphorical expressions were written, and the metaphorical sculptures we are about to compare with them were carved, we have represented a procession as issuing from the court behind the tower of the propylon. The king on his throne, carried by his guards, is just passing the threshold of the gate, attended by the fan-bearers and other officers of the household: the avenue leading to the temple is lined by charioteers and foot-soldiers, the whole being suggested by existing documents, and representations still extant upon the walls of tombs and temples. In the distance to the right of the spectator is the limestone peak of the Biban-el-Moluk, and the excavated hills of the opposite side of the Nile.

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* See vol. v., p. 228.

Without pausing to speculate as to whether this gateway was one of the hundred gates of the city of Thebes, out of which Homer tells us the warriors of Memnon issued to the Trojan war (Iliad, ix. 381), we will at once proceed to our immediate subject-matter. It will be observed, that on each side of the gate is seated a colossal statue of the Pharaoh who built this entrance to the Temple of Luxor, and that in front of each tower is a similar statue. This is to be especially noted, for in no instance does a statue of a king occur among the ruins of Egypt except by the side of a gate. It is probable that these important statues were so exclusively placed in obedience to an ancient custom, of which the first mention is found in Genesis, xviii. 1, 2; and again, chap. xxii. 17, there is an allusion to the same custom in the promise made to Abraham that his posterity should possess the gate of their enemies—that is, as we see in our picture, to sit as kings and governors at the gate of the city or palace. The gate was the place of honour and of judgment among the ancients. "Judges and officers shalt thou make thee in all thy gates." (Deut. xvi. 18.) It was in the gate of the city of Hebron that Abraham ratified, in the presence of the chiefs of the city, his purchase of the field and cave of Machpelah. (Gen. xxiii. 10.) It was in the gate of Bethlehem that the elders of the city assembled to give judgment in the case of Boaz and the relative of Naomi. (Ruth, iv. 1–11.) It was "beside the way of the gate" that Absalom stood to pervert any man who "came to the king for judgment." "And Absalom said unto him, See thy matters are good and right; but there is no man deputed of the king to hear thee." (2 Sam. xv. 2–5.) When, at the remonstrance of Joab, David ceased from mourning for Absalom, he "arose and sat in the gate. And they told unto all the people, saying, Behold, the king doth sit in the gate. And all the people came before the king." (2 Sam. xix. 8.)

Amos (v. 15, 10, 12) exhorts Israel to "establish judgment in the gate." He says also, "They hate him that rebuketh in the gate; they afflict the just, they take a bribe, and they turn aside the poor in the gate from their right." So likewise Isaiah, xxix. 21, "And lay a snare for him that reproveth in the gate."

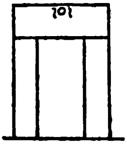
The foregoing quotations sufficiently prove the custom and the agreement between the metaphors derived from the Sacred Writings with what we have called the metaphorical sculptures of Egypt. That this custom was universal among the nations of antiquity may be inferred both from Scripture and other sources. Jeremiah tells us (xxxix. 3) that "all the princes of the king of Babylon came and sat in the middle gate." And again, we learn (Dan. ii. 49) that Shadrach, Meshach, and Abednego, were set "over the affairs of the province of Babylon; but Daniel sat in the gate of the king." See also Esther, ii. 19, 21; and iii. 2. To take another example from antiquity, we will quote the Monument of Harpagus (about B.C. 530), brought from Xanthus by Sir Charles Fellowes. In this monument the

Persian Satrap is represented as sitting at the gate of the city, attended by his umbrella-bearer, and accompanied by the officers of his court. He is either receiving the ambassadors of Greece, or else is giving judgment in the case of the three men who are standing before him dressed in the garb of the orators of Greece. The tenacity with which the peoples of the East adhere to their ancient traditions has caused this custom, among others, to be handed down even to the present time, as may be traced in the title "Sublime *Porte*," derived from the practice of administering justice and despatching public business at the gates.

We cannot quit this subject without remarking upon the simplicity of an Egyptian gate, with its undisguised lintel and doorposts, all so vividly reminding us of the memorable night on which so many doorposts and lintels in Egypt were marked with the blood of the passover. "And they shall take of the blood, and strike it on the two sideposts, and on the upper doorpost of the houses wherein they shall eat it." (Exod. xii. 7.)

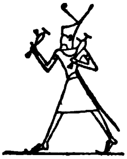
The lintel was always of one stone (Fig. 12) and the doorposts also were very frequently of only one block, while each of the three portions had its appropriate decoration. In the smaller doorways, where no curvetto and torus were superadded, the lintel bore the winged globe or protecting divinity of entrances, and was besides decorated with the names of the divinities to whom the temple was dedicated, and of the Pharaoh who built it. The doorposts also bore the name and title of the builder. In the larger gates, such as the propylon of Luxor, the globe was sculptured in the curvetto, and the posts decorated with figures of the king making offerings to the different divinities.

Fig. 12.



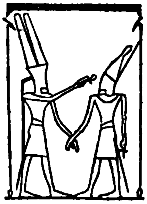
On each corner of the lintel is a representation of the king in a running action, and holding two vessels in his hands, in readiness to pour out a libation to the gods. (Fig. 13.) This subject is frequently repeated on the lintels of doorways, and the haste signified by the action of the king is suggestive of the same idea expressed in the words of the Psalmist (xvi. 4), "Their sorrows shall be multiplied that hasten after another god: their drink-offerings of blood will I not offer, nor take up their names into my lips."

Fig. 13.



The next metaphorical sculpture we shall notice frequently occurs in the sacred writings, and likewise in the sculptures. Thus, in Ps. lxiii. 8, "My soul followeth hard after thee: thy right hand upholdeth me." Again, "I am continually with thee: thou hast holden me by my right hand." (Ps. lxxiii. 23.) And among the earliest examples of the same metaphor in Egyptian sculpture (Fig. 14) one is to be found on the west face of the Obelisk of the Atmeidan in Constantinople, and another on the apex of the Lateran Obelisk, both the work of the same Pharaoh, Thothmosis III., who, according to Egyptologists, reigned before the time of Moses. In both these cases the inscription begins with the metaphor, as does likewise Isaiah, xlv., "Thus saith the Lord to his anointed, to Cyrus whose right hand I have holden, to subdue nations before him; and I will loose the loins of kings (see "Girdle of Strength," p. 235) to open before him the two-leaved gates."

Fig. 14.

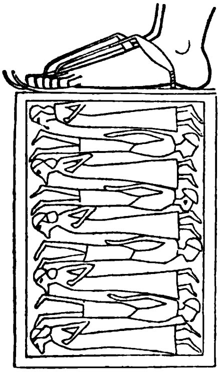


In many instances the divinity is made to promise the king dominion and long life; "There shall not be any among the kings like unto thee all thy days." "And if thou wilt walk in my ways, as thy father David did walk, then I will lengthen thy days." (1 Kings, iii. 13, 14.)

The sculpture of analogous metaphorical import, is the representation of the king standing between two of the divinities of Egypt who pour over him, as water out of a vase, a stream of hieroglyphics, symbolising life ☥ the symbol held by the god to the nostrils of the king in Fig. 14, and dominion 𓌀 the staff that supported the heavens, Fig. 14; sometimes life only.

The next metaphor is common in both the Old and New Testament, and is exactly embodied in the sculptures of Egypt. "Thou madest him to have dominion over the works of thy hands; thou hast put all things under his feet." (Ps. viii. 6.) "A nation meted out and trodden under foot." (Isa. xviii. 7; xlix. 23; lx. 14.) "Sit thou at my right-hand, until I make thine enemies thy footstool." (Ps. cx. 1.)

Fig. 15.



This particular metaphor is literally rendered in Egyptian sculpture, for there is scarcely a statue of a Pharaoh in existence which does not rest the feet on a footstool, on which is engraved a row of prisoners * (Fig. 15), or else place his feet on nine bows (Figs. 16, 17) signifying, as there is reason to believe, nine tribes or nations.

In one monument the infant king, Thothmes, is represented as placing his foot on a footstool, on which are sculptured nine prostrate figures, five bearded and long-robed, signifying Asiatic peoples; and four beardless and with short-robes, the distinctive marks of African tribes. An example of

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* See figure of Rameses. Crystal Palace.

Fig. 16.

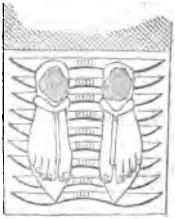


Fig. 17.

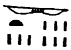
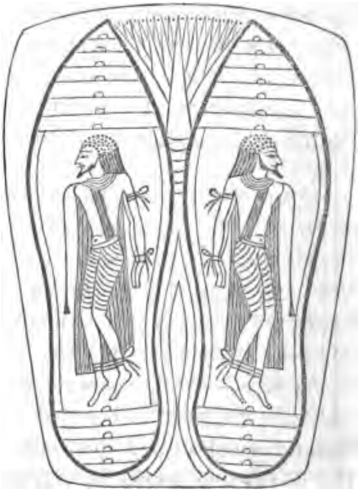


Fig. 18.



this metaphor occurs in the basso-relievo from Kalabshe, exhibited in the upper Egyptian room of the British Museum, where the Pharaoh, Rameses II., is seen trampling on two individuals of different Asiatic nations, while he is about to despatch a third. A yet more speaking evidence, however, of this metaphor, common to both the descendants of Heber and of Mizraim, will be found in the very same room of the British Museum, we refer to the Mummy of Harsen-t-atf—on the soles of whose shoes are painted the figures of two men with their arms tied behind them, (Fig. 18) embodying the metaphor in an unmistakeable form,—for these figures represent Asiatics, of that particular nation to the North of Egypt, the most constant and powerful enemies of the country of the deceased. Inasmuch as this symbol is found in connexion with the dead, we think it may fairly be contrasted with that more spiritual and Christian metaphor, signified by the figure of a lion at the foot of the effigy of the dead man, in so many ancient and mediæval Christian monuments, emblematic of victory over the great enemy of mankind, who is compared to a roaring lion. (1 Pet. v. 8.)

J. B.

PARABLES BY AGNES FRANZ.

The father of Agnes Franz was Regierungs-Rath (Government-Councillor), at Miltitz in Silesia, where she was born in 1794. Hers was one of those seemly lives of noble self-sacrifice, which we know so well to admire—so little to imitate. Devoted first to the care of her widowed mother, afterwards to her sisters' children, who had been left friendless but for her friendliness, seeking not her own things but the things of others, doing good according to her opportunity, and finding time to write her pleasant imaginings for our sakes also, she led her quiet and peaceable life manywheres; last and longest of all, in her cheerful upper room in Breslau, where, pictured by some friendly hand, we have had delightful glimpses of her in literary journals at calm, intellectual tea-parties, or playing with her adopted children round the tree at Christmas time: where, also, she died not long ago, to the grief of many who had learned to love her meek and quiet ways and working.

FROST-BLOSSOM.

"Dear father," exclaimed little Maurice, as he stepped out of his bed-room, and the early morning light shone cheerily into the room, "look here, oh, look! Beautiful white flowers have blossomed on our windows, just as finely shaped and as prettily covered with silver dust as the auricula you brought us yesterday, only much more beautiful, for they glisten as if they were made of diamonds."

"The winter will be doing the work of the spring," said smiling the father; "but trust it not. It is only like a teacher who is content in his pupils with outward show and splendour."

"Meanest thou then," inquired the boy, "that these flowers are more perishable than yonder one? don't they hang there on the window as fast as if a skilful hand had sewed them in? It seems to me as if they would long outlast the poor auricula, for it has drawn together its calyx so disconsolately, as if it thought itself dying, while these crystal twigs are expanding ever larger and lovelier."

"Only let the sun rise a little higher," answered the father, "and then thou wilt learn to distinguish between reality and semblance."

And when full day now began to gild the chamber, and the sunbeams touched the white flowers on the window, then they disappeared the one after the other; but the little auricula raised its velvety head to meet the warm sun's kiss, and speedily the fragrant calyx opened, displaying to the wondering boy the golden flower, and breathing on him with the breath of the spring.

"Alas, for the deceitful winter!" cried Maurice. "Henceforward I will tend the more carefully the little, modest auricula, and trust alone the fair, odorous spring-flowers."

"Knowest thou not, also, that the winter hath a lesson to give thee?" said the father. "Behold! delusions there are in plenty around us, and not the winter alone deceives us, but men, too, seek to delude by a false appearance and an empty show. There are many smooth words and much brilliant discourse current which may easily deceive a well-meaning heart, because it thinks to recognise therein the existence of love. But these, too, like the crystal flowers, are often merely the fruit of the frost, lacking altogether in life. A single testing ray of truth and they vanish into their own nothingness. But the noble heart is like the flower which unfolds ever and ever lovelier in the sunshine; its value can only become the greater to us the more the heavenly light enlightens our eyes. Oh, that thou mayst early learn to distinguish between the truth and the show, and flee those vain delusions which entice, indeed, but can never satisfy or enduringly bless the heart!"

So spake the father. But Maurice, in a quiet heart, laid up and pondered the lesson.

THE GRAIN OF CORN.

"See here, father," exclaimed Conrad, pointing to six heavy ears of corn which had all grown from a single grain, "see what an abundant blessing one little corn grain may have! We take little thought of it, but walk by with heedless tread, and every grain is a rich gift of God, in which a whole harvest is enclosed."

"So it is, my son," replied the father. "God hath bestowed on all that is good and profitable an especial blessing. He walks invisible through our fields, and causes the young sown crop to prosper, so that bread may never be lacking to the diligent man. And as He cares for our bodily needs, so hath He his eye directed with double care upon the soul—the much more important part of man. Also for this there is a grain of seed which may bring forth fruit an hundred-fold. It is the Living Word that comes from above, and was given to men in order to spread even further the kingdom of Love and Truth. Oh, my son, a single word of God's honour, spoken in the might of faith—a single deed of love done in His Spirit, may be likened to that seed-corn, and go on increasing ever in fruitfulness from generation to generation. Happy he to whom it is given to strew the golden grains of the Spirit, the costly seed of noble doctrine! He may either see the fruits thereof here below or no—in secret, also, doth the heavenly blessing unfold itself. But one day all shall be made manifest, and then shall it wave to meet Him—the golden harvest of which He sowed the seed, and angels shall bring home the sheaves, and God Himself shall rejoice over His wealthy autumn."

"Oh, father," cried Conrad, "thou hast said I should be a farmer and learn to cultivate the field. Oh, that I were also a sower after a spiritual sort, for more dearly than all might I call those sheaves mine on which the Heavenly Father looks down so well pleased."

THE LAST COMFORT.

The active and virtuous Almanzor saw the evening of his days coming on. Faithfully and honestly he had bestowed the years that the Lord had given him in doing good to his fellows,—had shared his possessions with the poor, and had sought to serve his brethren at the sacrifice of his own advantage. From his youth he had kept a day-book, in which he had registered every silent victory over himself, and every blessed deed of his life. He only and God knew what was therein, and he thought, "When once my life's sun is sinking, and all the joys and hopes of existence are growing dim and pale, then shall the memory of these hours arise over me like a comforting moonshine, to beam in peacefulness over the terror of the night of death into the darkness of the breaking eye, and to light me softly over into the field of heaven."

So thought Almanzor, and with secret satisfaction looked upon the book. Every page of it discovered to his soul an immortal joy, for everywhere his eye fell upon doings of charity and on the thanks and the blessing of those whom he had comforted or saved.

And it befell that the noble old man, visited by dangerous disease, sank upon the sick-bed. The pain to his members grew from day to day, and his soul was sorrowful. He felt that his hour was approaching and began to prepare himself for death. Life grew dim before him like a colourless picture, and all that had given him joy before seemed to him a worthless shadow.

And his friends came to him and took thought how they might cheer his soul. And they told him of the thriving of his plantations,—of the blessing that was on his crops,—of the new increase of his goods. But he turned his face from them, and the pains in his limbs grew worse, and his breast heaved in restless struggle, and he longed for relief.

Then his daughters came, and they prepared for him a precious draught. And they brought him wine and costly fruit; but soon as the invalid had brought the refreshment to his lips he shook his head mournfully, and turned away his countenance and sighed.

Then one of his sons bethought him of the day-book, of which he had once heard his father say, that it contained quickening and comfort for the last hours of life. And he sat down by the bedside, and, with a soft voice, began to read from it. But his friends stood in deep emotion around, and folded their hands as the secrets of that noblest soul became known to them, and as they looked into the heart of the dying, now, for the first time, laid open in all its nobleness before them. But Almanzor turned his countenance aside, more troubled than before, and a cold sweat covered his forehead, and his eye wandered about in the circle as if painfully seeking for somewhat.

Then sounding across from afar it came like a trumpet-clang, and a solemn music came moving nearer and nearer. With a triumphant sound did the words of the hymn, "Jesus, Thou art my confidence," pierce into the soul of the sufferer. And the form of Almanzor raised itself once more. A joyful brightness flew across the sunken features, and he received with upraised hands the cheering sound and listened, blissfully refreshed, till the tones of the hymn became undistinguishable in the distance.

Then a holy shudder passed through the assembled circle, and they sank upon their knees and bent down sighing over the hands of the seeming-glorified one.

But he looked on them and spake, "Why weep ye? Has my thirsty soul not found that it was longing after? I sought it first by myself in the feeble testimonies of my own faithfulness. But there is one comfort only in the hour of death—only one balm for the breaking heart. Praised be God that my soul hath found it!"

And in deep devotion he folded his hands over the laboriously breathing breast. And the hymn came yet sounding afar like the assurance of eternal life, and the evening sun poured down its departing light and sank gently to its rest.

Almanzor also bent his head, and the hymn became silent. The Angel of Death had carried the praying soul to its home.

THE LESSON OF THE FLOWERS.

"Whence comest thou, so solitary and so sad?" asked Emilius of his friend Albano, who, with an expression of deep and painful seriousness, was stepping forth from amid the churchyard cypresses.

"I have been laying in the earth a grain of seed," the other answered;—"a noble lovely seed;—grain holding within it a wealth of brave hopes. It is Elvira, my little daughter, whom I have been burying. I thought I might in the course of the years have had the pleasure of seeing her mind expand and blossom; but the Lord hath otherwise resolved. He has deferred my hope till that morning, when His mighty word, 'Let it be,' shall sound anew, and the bloom of an unfading life shall awake out of the mysterious seed of the graves."

OURSELVES.

THE BLOOD.

THE small size of the Thoracic duct (for, as was noticed before, it is about as large as a small straw), only allows the Lymph to be yielded, or, as it were, distilled, drop by drop, into the blood. As this occurs just immediately before the blood passes into the heart, each portion, each drop almost, becomes mixed up with the general mass before a succeeding one is introduced. Several hours elapse before the Colourless Lymph Capsules lose their identity. Their proportionate numbers, too, vary both with relation to the taking of food, and to different states of the system. Eleven hours after a meal, blood taken from a vein was found to contain 5·1 Colourless Capsules to 2000 coloured ones: while three hours after a good mid-day meal, the numbers had risen to 6·2. Any tendency to inflammation, among other unhealthy conditions, checks the change into red blood.

After the Chyle has been absorbed into the lacteals, and before it reaches the circulation, it becomes considerably altered. While passing, as it does, very slowly, through the coils of the tubes, of which the Mesenteric glands chiefly consist, it becomes inspissated, and assimilated to the blood in specific gravity, in capability of coagulation, and in almost all other particulars, excepting colour. It may, therefore, be considered as *Embryo blood.* Where and when its final change takes place, and how it is matured into red blood, Physiologists are unable to determine: nor have they ascertained, with anything like precision, the quantity furnished in a given time. Some indirect experiments suggest that, in a healthy adult man, under ordinary circumstances, from 4½ to 7 pounds are supplied in twenty-four hours. In this way the blood becomes continually enriched, and the "waste by life" obviated.

If a portion of blood be taken from a vein, received into a basin, and allowed to cool, it soon coagulates. After a time, a thin straw-coloured fluid, called *Serum*, exudes, little by little, from the Coagulum, leaving the mass a good deal denser. This denser mass is termed the *Crassamentum.*

If carefully agitated in water, it readily separates into two parts, into the *Cruor*, or colouring portion, which consists almost entirely of red globules; and a plastic fibrous lymph called *Fibrine.*

We have thus obtained the three principal constituents of blood,—the Serum, the Cruor, and the Fibrine. Their relative proportions vary a good deal: they differ with age, temperament, states of health, quality and quantity of the food, &c. &c. Commonly, from 78 to 80 per cent are fluid. Of the Solid Residuum about 14 parts are blood corpuscles; 6 to 7, albumen; ·2, fibrine; ·2, fat; ·7, saline ingredients.

Besides pure albumen, the *Serum* contains some sero-gelatinous material, amounting to 1½ per cent. In it, too, are dissolved the saline ingredients of the blood. Berzelius found free soda: muriate, lactate, and phosphate of soda: muriate of potass: and the elements of phosphate of lime, magnesia, and iron, in varying quantities.

The *Cruor* consists almost entirely of red corpuscles. Their shape has been a good deal disputed: and it is still undetermined whether they are circular discs or spherical globules. Their size is almost always uniform. A human blood corpuscle averages the 3560th of an inch in diameter; a horse's, the 4720th; a dog's, the 3330th; a cat's, the

4400th; a pig's, the 4220th; a cow's, the 4320th; a sheep's, the 5310th; a goat's, the 6350th.*

Their colour appears to be rather an adventitious than an essential ingredient of the corpuscles. Dr. Young found, that by treating a piece of flesh in water, the globules of the blood which it contained, subsided to the bottom of the vessel, and could be readily collected, free from colour, while the colouring-matter became diffused through the water. By most chemists the colour is thought to be produced by some salt of Iron.

The thread-like character of the *Fibrine* has caused it to be so named. It is the most highly animalised of all the blood's ingredients: from it the muscles and other membranous textures of the body are formed.

These are the staple articles of the Blood. In them are found the rudiments of all the structures of which the whole frame consists. To supply all the ordinary and extraordinary requirements, all the local and general needs of the system, they become combined and modified, or separated and simplified. Now a tear is wanted; and there a splice of bone to mend a fracture. A little saliva is needed to render some food sapid; and then the Gastric juice, which subdues and digests it. Fuel for the fire, which warms, and moisture for the exhaling vapour, which keeps us cool. In fact, the blood conveys the materials of our being, and of our wellbeing, to every part. It is Life's circulating medium. To preserve it from waste, and to diffuse it readily over the whole fabric, it is secured in, and conveyed by, a system of vessels called the *Vascular System*, which consists of *Arteries* and *Veins*, having the *Heart* for a common centre.

P. S.

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* These proportions become sometimes important in "Criminal Cases;" when it is desirable to ascertain whether spots or stains are of human blood or not.

CANDLES.

The History.—The early history of the methods employed for purposes of illumination is involved in some obscurity, and it is doubtful whether candles or lamps, or both, were used by the ancient Hebrews. Frequent mention is made in the Scriptures of both candles and lamps, but it is difficult now to know whether the Hebrew term translated *candle* is correct, or really means *lamp ;* for, in Leviticus, *lamps* in which olive oil was burnt were ordered to be placed upon *candle*-sticks, which Moses was commanded to make for the Tabernacle, after the model shown him in the Mount, as described in Exodus. Torches, which may be regarded as a rude substitute for candles, appear to have been employed at a very early date. They are mentioned as being used by the band of men and officers from the chief priests and Pharisees.

Candles made of wax (*cerea*), or tallow (*sebacea*), were in general used among the Romans before the invention of lamps. Ultimately the *candelæ* were only used by the poor, lamps having taken their place in the mansions of the wealthy. Pliny gives us at best only imperfect accounts of these things, and nowhere any description of the materials of which candles were made, although describing the method of bleaching wax. He says they used for a wick the pith of a kind of rush called *scirpus*, and incidentally alludes to the use of flax for the same purpose.

We learn from Fosbroke that, following the ancients, wax was employed in the middle ages as a material for candles, which were made of various sizes in moulds, the wick being formed of twisted tow; and we all know that

King Alfred marked the *hours of the day by the burning of his wax-candles.* In Beckman's "History of Inventions" we find a notice that Constantine caused the whole city of Constantinople to be illuminated with lamps and *wax-candles* on Christmas-eve.

The trade of wax-chandler was general in this country in the sixteenth century, both for the manufacture of tapers for religious rites and for preserving the bodies of the great, which was called "cering." Gilbert White, in his "Natural History of Selborne," minutely describes the method of covering rushes with tallow. We are indebted to a valuable modern work for an abstract of this process, which we introduce as the first reliable account we have of the manufacture of candles: —"A pound of rushes (*Juncus effusus*), containing 1600 individuals, was coated with six pounds of tallow, so that 228 lights weighed one pound, and cost a little over fivepence. The rushes were peeled on three sides for the best lights, and on two only for watch-lights, which were not required to give so much light, and which Gilbert White says, 'it is true, only shed a dismal one — darkness visible.'" Of the other kind he says, "that a good one, which measured two feet four and a half inches in length, burned fifty-seven minutes."

The first specification of any improvement to make candles in this country dates from 1799. A William Bolts subjected the material tallow and other animal fats to pressure, which was, in fact, in some measure anticipating our stearine. He also described a solid candle, with a short wick, which was placed in a holder, and maintained in its position on the end of the candle by the pressure of a spring — a plan which has been revived and carried into practice in our own day in Palmer's candle-lamps.

The history of subsequent improvements will be found more appropriately detailed in the description of the various processes and machines, which our readers will find in the following pages.

General Principles.—We will now just glance at the general principles involved in the *production of light*, by way of preface to one or two contributions on this subject.

Those bodies which are *not volatile* become luminous when exposed to a high heat; but this property varies very much with the chemical and physical character of the body—for example, the same degree of heat which causes *iron* to emit a *vivid white light*, will only render some *gaseous* bodies *visibly incandescent.* We have thus advanced a step, and find that *density*, as well as *temperature*, are essential to the production of artificial light, and that purely gaseous matter cannot be depended upon as a source of light, unless some solid particles are raised to a state of incandescence by heat evolved during their combustion. The conditions, therefore, for this object comprise a substance, or substances, undergoing combustion, or some electrical change which generates *heat*, which being communicated to some solid body, renders it incandescent, or capable of evolving *light.* All the different plans of obtaining artificial light in common use involve the employment of some substance which, during the process of combustion, evolves a solid body—*carbon*—which is heated to incandescence *before being consumed*, and which is shown in a very remarkable manner in a little apparatus invented by Mr. Goddard, of Ipswich.

But we must limit this broad statement; for of many bodies fulfilling the above conditions very few are adapted for general use, for various reasons. Thus, phosphorus and zinc burn with a brilliant light—the acid of the former, and the oxide of the latter, remaining for a few moments within the spheres of combustion, and becoming incandescent; but as both these products are *not volatile*, they are deposited near the flame, being both injurious and troublesome.

Hence, for general use, another condition is essential, that the *products of combustion* should be *volatile*, and thus, in the flames of coal-gas, lamps, and candles, the *carbon*, which is the *source* of the light by its incandescence in a *solid form*, ultimately passes off as *carbonic acid gas*. When carburetted hydrogen, the principal gaseous compound of coal-gas, is ignited in the air, the two constituents of which it is composed do not combine with the oxygen at the *same moment*. The *hydrogen* is *first burnt*, producing a faint blue light, accompanied by intense heat, which causes the other *nascent* constituent, the *carbon*, to become incandescent, and therefore luminous. This incandescent floating carbon is carried to the outside of the flame where the oxygen converts it into carbonic acid, while another portion of solid carbon immediately replaces that consumed, and thus continues a *supply of light*. A simple experiment speaks the truth of this explanation, for if chlorine be substituted in the place of oxygen, the first act of the process only is performed, the hydrogen burning so to produce *hydrochloric acid* instead of *water*, while the *carbon* is deposited as *soot*. Therefore those gases or vapours which contain the most carbon will yield the most light.

Now let us see how these principles apply to the flame of a candle. It is obvious that no substance can be employed which leaves a solid residue on distillation; and this at once suggests a distinction between gas illumination and other sources of artificial light. In the solid and liquid fats, which are all volatile, on the contrary, the heat produced by the combustion of the gases they evolve in giving light is employed to keep up the process of distillation. Thus, in a lighted candle, the fat below the flame is melted into the form of a hollow cup containing liquid fat, by the heat radiated downwards from the flame. This reservoir of liquid fat is the source whence the wick draws its supply, which is constantly renewed during the combustion of the candle.

The fluid fat rises to the region of combustion by *capillary attraction*, the interstices between the fibres of the wick forming a number of minute or *capillary* cylindrical spaces. The fat is not immediately consumed, but undergoes a process of dry distillation, the flame which envelopes the gaseous matter protecting it from the surrounding atmosphere. A dark central cone, in contact with the wick, is filled with carbo-hydrogens, the gaseous product of the action of the heat on the liquid fat, and which may be drawn off by means of a thin glass tube open at both ends, and actually ignited as they issue at the outer end. A white zone of flame surrounds this dark region, where the gases produced in the central cone come in contact with the air, and whence, in fact, all the light of the candle is derived. The hydrogen first combines with the oxygen, generating intense heat, while the carbon, for the simultaneous combustion of which there is an insufficient supply of air, becomes incandescent, and thus produces light. The luminous portion of the flame, lastly, is surrounded by an almost invisible flame, where the whole of the carbon is finally converted into carbonic acid gas.

We now turn to

The materials, and their preparation.—There are several substances which are chemically adapted for the production of light, but commercial considerations have limited the supply to coal, resin, tallow, spermaceti, wax, and some of the fat and volatile oils of animal and vegetable origin.

The Fats are found very generally diffused through nature, and play a very important part in domestic economy, being largely consumed as food, indispensable in the manufacture of soap, and admirably adapted for the production of light. The chief source of supply is in the organised structures of plants and animals, but the economical production of paraffin from coals by Young, and the conversion of *sugar* into the fatty *butyric* acid by a fermentative process with the aid of cheese by Pelouze, suggests the possibility that chemistry, in its rapid progress, may at last discover some method for the artificial preparation of these important bodies. They, of course, are of most value as articles of food: and are never employed for the production of light, nor the manufacture of soap, except when in superabundance, or in some form which is unpalatable. The large proportion of carbon (70 to 80) which they contain renders them peculiarly suitable for food and light, and, in truth, distinguishes them from most other bodies. In their natural state they are not homogeneous substances, but mixtures of several different bodies: some are solid at ordinary temperatures, as *stearine* (στεὰρ, tallow), others fluid even at 32° Fahr. as *oleine* (ἔλαιον, oil), and of course those which contain the largest proportion of the former require a higher temperature for melting. The different varieties of *tallow* are solid, the *oils* liquid, and intermediate are found all the kinds of *grease*, which, strange to say, have not yet been employed for lighting purposes, as no plan has been found adapted to their natural condition.

The following table shows the ultimate composition of some of the common oils, fats, &c., employed for giving light in their crude state:—

Name of Oil.	Carbon.	Hydrogen.	Oxygen.
Olive oil	77·21	13·36	9·43
Train oil	76·13	12·40	11·50
Sperm oil	78·90	10·97	10·13
Spermaceti . . .	81·60	12·80	5·60
Bees-wax	81·80	12·67	5·54
Animal tallow . . .	78·10	11·70	9·30
Stearin	78·74	12·39	8·87
Olein	78·57	11·45	9·98
Palmatin	76·36	12·00	11·64
Resin	79·27	10·15	10·58
Oil of turpentine . .	84·60	11·73	3·67
Paraffine	85·22	14·78	3·67
Olefiant gas . . .	85·22	14·78	3·67

And the next table shows the relative proportion of the solid and liquid constituents of some of the fatty bodies :

100 parts yielded	Fluid.	Solid.
Fresh butter, in summer .	60	40
,, ,, in winter .	37	63
Hog's lard . . .	62	38
Ox marrow . . .	24	76
Mutton suet . . .	26	74
Olive oil	72	28
Palm oil	69	31

Nearly all the fatty bodies employed for purposes of illumination are *fixed*, that is, they do not *evaporate* like the volatile oils, nor can they be strongly heated without decomposition, the basic ingredient *glycerine* in its conversion into *acroleine* giving rise to those pungent irritating vapours which accompany the boiling of oil.

The action of oxygen again divides them into two other classes, some becoming *rancid*, and others being converted into *resins*.

The strong mineral acids either convert them into new bodies or enter into combination with them, upon which latter reaction depends the modern stearic candle manufacture.

The strong alkalies and lime decompose the fats, combining with the fatty acid and liberating the glycerine, being analogous, for example, to the action of lime on carbonate of soda, when the former takes the carbonic acid of the latter and becomes insoluble, while the soda remains, like the glycerine, in solution. This reaction forms the basis of the manufacture of soap, and is now extensively employed for separating the fatty acids in making candles.

The more expensive fat oils of commerce are often adulterated with cheaper oils and the detection of these fraudulent mixtures is attended with great difficulty.

The vegetable fats and oils are most abundant in the fruits, particularly in the seeds of plants, and we will select a few of the more important for description. T. R.

(*To be continued.*)

REVIEW OF THE MONTH.

THE last few weeks have removed many names of note from the land of the living: Mr. Gilbert A'Beckett, the author of "The Comic History of England;" Mr. Yarrell, whose delightful works on British Birds and British Fishes have long been among the choicest treasures of the English naturalist; Sir John Ross, the Arctic navigator, whose sea-faring life commenced seventy years ago; Sir Richard Westmacott, the pupil of Canova, and the sculptor of so many well-known statues; Sir William Temple, the venerable diplomatist, and one of the last representatives of a historic line; and Mrs. Schimmelpenninck, whose "Memoirs of Port Royal" brought many English readers first acquainted with a remarkable phasis of French and Romanist piety.

Now that the war is ended, it is to be hoped that some "peaceful fruits" may spring up among the nations engaged. The Sultan has proclaimed complete religious liberty to all his subjects; consequently, it is no longer a capital crime to renounce Mahometanism, and the door is open to preach the Gospel to the twenty millions of Moslems in Turkey. Of this opportunity the first to take advantage is the religious society known as the Countess of Huntingdon's Connexion, which is preparing to send out a missionary. But at the outset there will be need for wisdom, as well as zeal. The edict of toleration is a concession of the Sultan to his Allies; it is contrary to the Koran; it is far in advance of the spirit of the people, and in the face of the prevailing fanaticism it will need the utmost firmness on the part of the Government to carry it into execution. Meanwhile, the operations of the American missionaries among the nominal Christians of Turkey proceed with unabated vigour and increasing success.—By a route not a little remarkable the Bible is entering Italy. Eighteen thousand copies of the Scriptures have gone to Sardinia from the Crimea. The avidity with which the Piedmontese soldiery have sought the Word of God is full of promise as regards its results in future. On the first day of his arrival at the Sardinian hospital at Yenikoi, Mr. Duncan Matheson, the chief agent in the distribution, was visited by seven hundred officers and men, eager for a copy; and several instances came to light where, through copies previously dispersed, the eyes of earnest readers had been opened to the great truths of the Gospel.—What benefits may accrue to France herself it is not so easy to prognosticate; but, it is to be feared, there is yet little faith in that land. Father Valery, a Jesuit, has lately published a pamphlet, giving a sad view of the prevailing irreligion, and his statistics are not the less significant because his standard is Romanist. According to his estimate, in the large towns not one man in twenty ever comes to the communion; and although the state of the female population is more satisfactory, even of these many have learned to doubt regarding the infallibility of the Church, indulgences, purgatory, &c., and to express opinions which can scarcely be distinguished from infidelity or—Protestantism!

In the year 1854, through the tact and energy of Commodore Perry, the government of the United States succeeded in forming a commercial treaty with the empire of Japan, which promises to open its islands to the trade of the world. A Narrative of Commodore Perry's Expedition has just been published, and a more curious and entertaining book of voyages has not appeared since the days of Captain Cook. The opportunities of observation enjoyed by the American explorers were unique, and, with the aid of a clever draughtsman, they have been turned to the best account. Besides, the pen of Dr. Hawks has given a charm to the recital which is often wanting in the rough jottings of the naval log-book.

The old Dog barks

JACOB CATS AND HIS EMBLEMS.

Jacob Cats was born at Brouwershaven, in Zeeland, in 1577. He studied law first at Leyden, and then at Orleans, and, as an advocate in the courts of the Netherlands, he obtained great and early distinction by his successful management of some cases which he was called to conduct. His "alma mater," Leyden, offered him a chair of jurisprudence, but he preferred the career of statesmanship; and by the great ability, and still greater integrity, which he devoted to the service of his country, he gained golden opinions from all his fellow-citizens, till in the year 1636 a unanimous vote called him to the highest post of honour as grand-pensionary, or prime-minister, of Holland. This office he held in the fear of God and for his country's welfare, till the year 1651. He then, after the opening of the States-General, abdicated, and, having obtained his discharge, he dropped upon his knees in the midst of the assembly, and returned thanks to the Most High for the help he had received in the long and difficult, but distinguished career which that moment completed. It was an affecting spectacle,—the old man of seventy-four, with reputation so unsullied, and so universally beloved, retiring from the administration of one of the most powerful governments then existing, and in the fulness of his heart, and with all simplicity and godly sincerity, in the presence of his fellow-citizens and senators, making this public, but unostentatious acknowledgment to Him who had so often been a present help in time of trouble.

From public life he retired to his country-seat at Zorgvliet, near the Hague, where he passed his time in reading his Bible, and inditing such poems as "The Octogenarian's Retrospect," and in cheerful converse with his friends, and where he died September 12, 1660.*

Cats paid three visits to England in his time: the first when he was a young man, suffering from a lingering ague or fever, and when he hoped in vain to be cured by Queen Elizabeth's famed physician, Dr. Butler. The next time was as ambassador in 1627, when he was knighted by Charles I., so that we of this country ought to call him Sir James Cats. His last visit was immediately after his resignation of the office of grand-pensionary,—an embassy, which, however, did not prevent the breaking out of a miserable war between the two great Protestant republics of England and Holland.

The calling of Jacob Cats was law, statesmanship, diplomacy: but his passion was for poetry. Like a dear wife whose quiet words are the evening's solace, and for a day of whose undisturbed society it is worth while to work hard a month, he was wedded to the Muse, and was a true lover to the last. His favourite vein was Christian ethics, including most especially the practical, every-day virtues; and the form in which he chiefly gave forth his "good matter" was allegories, emblems, apologues. In this line of literature he was apparently inexhaustible, and we are disposed to think he is unrivalled in any language. With a lively fancy he had a wonderful knowledge of human nature. As a lawyer, a minister of state, a traveller, above all as a Christian who communed with his own heart, he had rare opportunities of observing, and what would have made a worldling cynical, only made this warm-hearted old man the shrewdest of sages and the kindest of counsellors. After all, there is no eye so sharp as a pure heart, and no one sees better through other people's masques than he who wears none of his own.

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* "L'Histoire de la Litterature Néerlandaise," par Gravenweert. "Biographie Universelle," tom. vii. Zedler's "Lexicon," band 5. "Penny Cyclopædia." It is hardly creditable to our biographical dictionaries, and most of our Encyclopædias, that they contain no notice of the most popular author in the Netherlands.

To this day the works of "Father Cats" are household books in Holland. With their quaint pictures adorning every page, their amusing stories and captivating rhymes, they are favourites especially with youth and with the pious peasantry: so much so that they are sometimes called "The Young People's Bible;" and his meditations on "Matrimony" used to be a universal bridal present. It would be difficult to find another book combining so much original humour, lively description, and kind feeling, with so much good sense and so many of the maxims of heavenly wisdom.

Chiefly for the sake of the clever pictures with which they are adorned, volumes of Cats's Emblems are often found in the libraries of English collectors. The illustration which we have faithfully copied is taken from the "Spiegel van den Ouden ende Nieuwen Tijt," or "Mirror of the Old and New Time," 1635. It speaks pretty plainly for itself, and the letterpress speaks for it somewhat to the following effect:—

Though Birky bark the livelong night,
  I never mind the whelp;
The merest mouse or wandering cat
  Sets up his idle yelp.

Old Watch again's a beast of sense,
  And when I hear him call,
I know some rogue is at the hens,
  Or on the orchard wall.

Ev'n now I heard his honest growl,
  And, though the bed is warm,
I must look out; for, take my word,
  It is no false alarm.

Stop thief! stop thief! young gallows-bird,
  I know you, neighbour Nat;
Your sport is spoiled, and in the stocks
  You'll pay me tit for tat.

He's off: we're safe: I'm back to bed:
  But ere I fall asleep,
Accept this hint:—Young hearts for deeds,
  Old heads for counsel keep.

Around all these emblems there is a garnish of proverbs and pungent sayings, gathered from the literature of many lands. For example, the one just quoted is followed by a polyglott of proverbs to the effect, "It is not for nothing that the old dog barks."

German.—"Wenn der alte Hund kläfft, so soll Mann aufsehen."

Italian.—"Cane vecchio non baia indarno."

French.—"Quand le vieil chien aboye, il donne conseil."

Spanish.—"El perro vieio si ladra da conseio."

Dutch.—"Met jonge te Krijgen, met oude te raden."

"Een oude Kat speelt met geen balleken."

Latin.—"Senum consilia, juvenum lanceæ."—*Erasmus.*

"Longiùs insidias curva videbit anus."—*Ovid.*

H.

MRS. SHERWOOD.

(*Concluded.*)

Life, in its various stages, has been compared to a series of dissolving views, in which one scene blends so gradually and imperceptibly into another, that it is often only by a strong effort of memory we can realise how entirely all around us is changed from what it used to be. Even so was it with the biography we have undertaken to trace.

The dull house at Bridgenorth was exchanged for military quarters, and the monotonous life of the "daughter at home," for all the bustle and excitement which attend a soldier's wife. We must not follow all these migrations, but cannot afford to pass over one incident related during their sojourn at Sunderland, for this will help us to form an estimate of the religious knowledge at that time possessed by Mrs. Sherwood. That she had an increasing tenderness of conscience, amounting occasionally to morbid scrupulousness, we cannot doubt from many passages in her previous life. She had formed for herself very strict rules, but evidently with a view to erect a foundation of self-righteousness; and it was only by a very gradual process that she was brought to say with the apostle, "Other foundation can no man lay than that is laid, which is Jesus Christ." Had religion been with her then, as it afterwards became, the "one thing needful," it could hardly have been left for a painful discovery after her marriage that her husband's views on the subject were altogether unsettled. While setting herself diligently to study the Word of God, he "calmly let her know that he was not quite convinced that the Bible was true, although he thought parts of it might be so!" A painful discussion ensued, ending in his assurance that he would not interfere with her, and that she might do just as she pleased in religious matters. She honestly confesses that she did not behave well on the occasion, for anger, rather than sorrow, was stirred within her. Something of honest indignation was, perhaps, excusable, as he had not alluded to these differences during the period of their engagement, yet conscience must have whispered that this was not the time when such a discovery ought to be made. There were other subjects, too, which might well press heavily on any thoughtful mind, and which must frequently have weighed upon her spirits in the earlier portion of her married life. She informs us that the state of the 53d was then a disgrace to the army, and many a character then studied served hereafter to "point a moral" in her tales.

While the regiment was stationed at Morpeth, her husband being just made paymaster, she was called to rejoice over the birth of her first-born child, whose name combined that of both parents, Mary Henrietta. A double blessing seemed to rest upon her birth, for, says the happy mother, "Her father doubled my gratitude to God, by saying, in the moment of his thankfulness, that he would read the Bible to me every day. And from thenceforward this promise was kept." This much-loved daughter was spared to welcome them home after many years' wandering; but bitter was the pang of parting from her when, in all the dawning intelligence which makes a baby of eleven months old so winning, the 53d being ordered to the East Indies, the fond mother had to leave her treasure behind. The struggle seems to have been almost heart-breaking. Never were motherly instincts more strongly developed than in Mrs. Sherwood. Can we wonder, then, that in this particular point her heavenly Father saw fit to try her? One after another of the lovely babies born to them in India was taken away, till she was well-nigh desolate. But " Who teacheth like Him?"

We must not attempt to describe the voyage, fraught with danger, and by no means destitute of startling incidents, but rejoin Mr. and Mrs. Sherwood in the land of their adoption. We are obliged to pass over the landing at Madras, the description of curious sights and novel sounds which meet a stranger on first arriving, and look in upon them when settled in their new home at Dinapore. And here we trace the beginnings of those important labours among the children of the regiment which formed so striking a feature in Mrs. Sherwood's future life, and for which no doubt the school-work at home had in some degree prepared her. She thoroughly loved children, and no others should attempt their training. But if patience is always needed for this work, surely " long patience must be exercised towards those in whom perpetual association with all that is degrading has strengthened the evil which is bound up in the heart of a child." A most valuable helper in these labours was found in Sergeant Clarke, who, though having somewhat military ideas of school discipline in the use of his cane, was nevertheless a hearty and right-minded man.

Their next station was Berhampore, "a region of miasma, a place of graves." Such is her short but expressive description. There is a deathly paleness there on every face, the very lips being colourless. Here her little Henry sickened and died, and very touching is the account of all she suffered in losing him; but God was teaching her the danger of that idolatry to which her fond heart clung, and deepening the lessons of Divine truth which she was receiving through the instrumentality of the good chaplain, Mr. Parson, who was, indeed, to her at this trying season "a son of consolation."

A companion for her remaining child, her little Lucy, was soon found in the person of a poor motherless babe whom she received and tended as her own. Perhaps there is no better proof that sorrow has brought a blessing with it than when it enlarges the heart of the sufferer with sympathy for others, instead of contracting it into a narrow selfishness. She remarks that her heart was so filled at that time with feelings of pity for little children, that she would have gone all lengths to serve them.

But we must pass on to the period when Mrs. Sherwood became associated with that little band of believers whose names will be treasured wherever the cause of missions to the heathen is loved as it deserves to be. What Christian heart does not kindle at the mention of such names as Henry Martyn and Daniel Corrie? We seem treading on holy ground while we are brought into intimate communion with men "of whom the world was not worthy." Henry Martyn's inner life has been laid open to the Christian public by his Journals and Letters in a way which has made us feel as if little could now be told which would enable us to know him better; but we should be very sorry to lose those finishing touches which a female hand has added to the portrait:—

"The instant we came to anchor at Dinapore Mr. Sherwood set out on foot to carry a letter which he had brought from Mr. Parson to Mr. Henry Martyn, who eventually became one of our dearest friends. . . . . I perfectly remember the figure of that simple-hearted and holy young man, when he entered our budgerow. He was dressed in white, and looked very pale, which, however, was nothing singular in India; his hair, a light brown, was raised from his forehead, which was a remarkably fine one. His features were not regular, but the expression was so luminous, so intellectual, so affectionate, so beaming with Divine charity, that no one could have looked at his features, and thought of their shape or form,—the out-beaming of his soul would absorb the attention of every observer. There was a very decided air, too, of the gentleman about Mr. Martyn, and a perfection of manners which, from his extreme attention to all minute civilities, might seem almost inconsistent with the general bent of his thoughts to the most serious subjects. He was as remarkable for ease as for cheerfulness."

He invited his new friends to stay with him, and what was wanting in outward accommodation, was made up to them in the delightful intercourse they enjoyed with him. "His house was destitute of every comfort, though he had multitudes of people about him. I had been troubled with a pain in my face, and there was not such a thing as a pillow in the house."

They were then on their way to Cawnpore, where they were enabled afterwards to receive him to more comfortable quarters; and much he needed their tender sympathy.

"The mode of existence of an English family during the hot winds in India is so very unlike anything in Europe that I must not omit to describe it, with reference especially to my own situation then at Cawnpore. Every outer door of the house and every window is closed; all the interior doors and venetians are, however, open, while most of the private apartments are shut in by drop curtains or screens of grass, looking like fine wire-work, partially covered with green silk. The hall, which never has any other than borrowed lights in any bungalow, is always in the centre of the house. . . . In the hot winds I always sat in the hall at Cawnpore. Though I was that year without any baby of my own (she had laid her cherished Lucy, too, in an Indian grave), I had my orphan, my little Annie, always by me. . . . During these mornings we heard no sounds but the monotonous click-click of the punkah, or the melancholy moaning of the burning blast without, with the splash and dripping of the water thrown over the tatties. On the 30th of May the Rev. Henry Martyn arrived at our bungalow. The former chaplain had proceeded to the Presidency, and we were so highly favoured as to have Mr. Martyn appointed in his place. It was in the morning, and we were situated as above described, the desert winds blowing like fire without, when we suddenly heard the quick steps of many bearers. Mr. Sherwood ran out to the leeward of the house, and exclaimed, 'Mr. Martyn!' The next moment I saw him leading in that excellent man, and saw our visitor, a moment afterwards, fall down in a fainting fit. He had travelled in a palanquin from Dinapore, and the first part of the way he moved only by

night. But between Cawnpore and Allahabad (230 miles) there is no resting-place, and he was compelled for two days and two nights to journey on in his palanquin, exposed to the raging heat of a fiery wind. He arrived, therefore, quite exhausted, and under the influence of fever. We had a couch set for him in the hall. There he was laid, and very ill he was for a day or two. When he got a little better he became very cheerful, and seemed quite happy with us all about him."

His love for children was a very marked feature in his character, and at this time the gentle orphan, Annie, often pleasantly beguiled him from those Hebrew studies which were becoming almost too absorbing. He was ever ready to lay aside his lexicons for the prattle of a little coaxing child, whom he alternately caressed and instructed. Why should the question force itself upon us,—"What might Henry Martyn have been, surrounded by those domestic ties for which his heart so yearned, but which were providentially denied him ?" He has long since rested from his labours ; he knows that every step of that weary pilgrimage was wisely ordered ; that the desolate home, and the lonely death-bed, and the unhonoured grave, his "evil things," were but preparations for those mansions in Heaven, where "Christ is all and in all." Oh ! may men, like-minded with him, be raised up to carry on that glorious work for which he lived and died !

We have been tempted into so long a digression, that we must devote only a few words to his fellow-labourer, Daniel Corrie (afterwards Bishop of Madras). Humble, courteous, tender-hearted, benevolent, even playful occasionally, he won the love of all with whom he conversed, and truly "pleased his neighbour for his good, to edification." When will Christians generally learn to keep this great rule constantly in view ? Too often we are contented to please without edifying, or we try to edify without pleasing. The truth is that we think of self more than of our Master.

Mrs. Sherwood's own efforts among her scholars were surprising, when we consider that delicate health and repeated domestic bereavements were added to the enervating effects of an Indian climate. She thus describes her daily employments :—

> "We worked very hard with the children. I generally heard four classes: one of great boys, another of the elder girls, and two classes of the younger children. Many of the first set, having been brought from Europe, died before we left India; some of the older girls also died, and some married. Many married officers above their own birth, and some proved their affection to me in after-life."

She was also engaged, during a great part of this time in literary labours—indeed they almost necessarily sprang out of her educational schemes.

> " Having finished the 'Indian Pilgrim,' I began to write my 'Church Catechism' for the use of my school, for I had a little before been thoroughly perplexed by finding that the children could not understand any common English narrative without asking many questions;—for instance, one said, 'What is a barn?' another, 'Do they walk out at noon without a chatta? Are they not afraid of serpents in the grass?' This was rather too much; and what could I do but write for them myself? And with this idea I began the 'Church Catechism,' making use of any tale or conversation from the barracks which I might chance to hear."

This useful Cawnpore life was for a season interrupted by an expedition to Calcutta, preparatory to a projected voyage to England, which Mrs. Sherwood was induced to contemplate, in the hope of rescuing her infant from an early grave. This involved many painful partings; but her chief anxiety—the well-being of her two beloved orphan charges—was happily relieved by the adoption of Annie Childe into the family of Mr. and Miss Corrie, who treated her with almost parental love, and a similar offer from a lady at Benares provided for the other. These plans, however, were most unexpectedly frustrated, for, on arriving at Calcutta, and seeking further medical advice, it was decided, to the great relief of both parents, that with judicious care there was no reason their child should not be reared in India ; and thus, after a most refreshing sojourn among that devoted little band of fellow-Christians, whom the Rev. David Browne gathered round him, they thankfully set forth in their budgerow to return to their beloved Cawnpore.

Those who have traced her history thus far will scarcely be prepared for Mrs. Sherwood's repeated assurance that she was all this time under very mistaken, or rather very inadequate, views of religious truth. We cannot think so ; "a good tree cannot bring forth evil fruit," and surely all she has told us of her life and labours proves that hers was no less a "work of faith" than a "labour of love." It is painful to find her speaking with something like compassion for what she considers a similar deficiency in Henry Martyn ; but her writings will best explain in what respects her views became altered.

We pass over the few succeeding years, varied by different regimental movements, which occasionally involved the necessity for Mr. Sherwood's prolonged absence from home, during which the energy and firmness of his wife's mind, and her happy power of adapting herself to circumstances, were fully developed. The management of an Indian household can be no easy matter to accomplish, and in this case were added the care of many helpless orphans, and all the difficulties attending the maintenance of Divine worship after the chaplain's removal.

It was time to seek the refreshment of a visit to England, where Mrs. Sherwood's mother was still living in advanced age, and, obtaining leave of absence for one year, the paymastership of the regiment, which Mr. Sherwood had held for twenty years, was resigned into other hands, and the whole party set sail for their native land. A fearful storm overtook them, of which we have the following record :—

> "For some hours we had nothing before us but death. I prayed most earnestly that, whether living or dying, our Saviour would be with us. I thank God that He made me more submissive to the thoughts of death, for myself and those I loved, than I had been during a former storm. I commended myself to the Lord Jehovah, and solemnly renounced for myself and children all pleas for mercy but through the merits of Christ my Saviour. I felt in those dread hours, with the saints of old, that nothing is precious, nothing desirable, but the Lord Jesus Christ."

They landed at last in safety at Liverpool, and lost no time in travelling into Worcestershire, where the welcomes awaiting them from an aged mother and a grown-up daughter (parted from in so much anguish) must have made those many years of Indian life appear "but as a dream when one awaketh." It seems to have been a peculiar blessing that the last few months of Mrs. Butts' declining life should have been so soothed and cheered. The still brighter light of clearer spiritual discernment was given too, and her end was emphatically "peace."

But now once more returned to an English home, could our authoress be idle ? No ; employment was to her active spirit a necessity, and, as usual, her love for young people directed the course her energies should take. She resolved on receiving some pupils to educate with her own children. Pecuniary considerations, in the first place, made it desirable ; for their income was hardly equal to the expenses of their family, and Mr. Sherwood's earnest desire to be separated from them no more, inclined him to think of selling his commission. They had now five children of their own, and two orphan girls to support, besides many *protégées* in India who had claims on them. Moreover, the style of living in the East was by no means a good preparation for economising in England; but, perhaps, the chief reason after all was to be found in a very decided love for educational work. "I dearly loved the society of young persons," writes the warm-hearted teacher; "I rejoiced in the numbers of cheerful faces around me. As Mr. Sherwood never put a check upon my making our house the asylum for motherless girls in India, so in England he let me do what I would."

But this was not the only part of her English life which was to be but the counterpart of that which had preceded it. Soon her youngest boy, her "little Benjamin," as she called him, was laid in the grave, which had received, but a short time before, one of the Indian orphans. It was a sore trial, and her spirits for a time seemed quite to give way; but a little visit paid to the scenes of her husband's early life, and yet more, perhaps, the congenial influence of home duties and country pursuits, gradually restored her to cheerfulness; and though this was not the last trial of the kind she was called to endure, she could at length thank God for her "five children in heaven."

Two very pleasing circumstances are recorded which beautifully illustrate the promise we all so often need to sustain our sinking faith, "Cast thy bread upon the waters, and thou shalt find it after many days." An invitation from the major of the 53d took Mrs. Sherwood with her husband and children to Weedon barracks, where the regiment was then stationed.

> "In passing through the hall I found it half filled with officers, and as many as eight members of the band, all waiting to see me. The youths stood together; they were all full-grown, tall, military men, finely drawn up, and well acquainted with what was due from themselves to me. For an instant I knew not one of them, but soon I recognised in them the babes I had nursed, and dressed, and lulled to sleep, and the boys I had taught whilst yet scarce able to lisp their letters. . . . How gratified was I to hear the most favourable account of these boys! . . . Such a minute is worth many, many petty annoyances."

Another incident of a similar kind awaited her some years afterwards on re-visiting Bridgenorth, when eight of her old Sunday scholars, now worn-looking women far advanced in life, received her with the warmest affection, and gave her most satisfactory accounts of all, save one, who had been under her instruction with them. It should encourage many a Sunday-school teacher to hear that after their teachers had been taken from them, the elder pupils made a practice of meeting together on Sunday evenings to pray for a blessing on the sisters, and that they might never forget the truths they had heard.

But years were increasing on Mrs. Sherwood, pupils were no longer necessary to her income, and she and her husband yielded to the wishes of their children, and prepared for a Continental tour. Of her intercourse with good Dr. Malan at Geneva she speaks in the warmest terms, believing him to have been the appointed instrument for guiding her into fuller views of Christian doctrine than she had hitherto attained. However this may be, none who have looked on his truly apostolic countenance, beaming with the love which is so peculiarly its characteristic, can doubt that her spirit was refreshed by communion with such a man. The services in his chapel, especially the hearty singing of his own elevating hymns, affected her deeply, as they have done many a worshipper before and since at the Pré l'Evêque, and we cannot doubt he was allowed to build her up on the right foundation.

But we have already far exceeded the limits we had prescribed for this little sketch of a life so varied in its outward aspect, that selection has been no easy task. "It is a difficult thing," it has been well said, "to grow old gracefully," yet here is an old age presented to us brightened by many a sunset hue. Hear one of the closing remarks in her somewhat lengthy diary. "Thus my lines are placed in pleasant pastures, and days and months pass, and old age steals on so gently, that now, in my seventy-fourth year, I can read the smallest print, write four or five hours a-day, sleep with unbroken rest at night, and declare myself, with grateful heart, one of the very happiest old women that ever cumbered this earth." The very last entry is this:— "*Written on the 23d of January*, 1847, 'Thou wilt keep him in perfect peace whose mind is stayed on Thee.'" Then follow a few pages of mournful interest from the affectionate daughter who watched her declining years. Gradually the mother and child seemed to be changing places. The books which were to be their joint production became almost wholly the daughter's task. It seemed as if every earthly tie were to be loosened that the soul might be free for its heavenward flight. Captain Sherwood, after a painful and distressing illness, was called to his rest; and, chastened in spirit, yet with a heart fully alive to all the best interests of those around her, she waited meekly till the summons should come to join her many loved and lost ones in their Father's home. Her dying bed was lovingly tended by her two remaining daughters, and her parting words must still echo sweetly in their hearts,—"Remember this, my children, that God is Love. He that dwelleth in love, dwelleth in God, and God in him." A.

LIFE, IN ITS HIGHER FORMS.

No. V. (*continued.*)

Mammalia.

A year or two ago the great lion in the Zoological Gardens, which all London was running to see, was an uncouth, lanky, low-limbed creature, with extraordinary longitude of snout, and as conspicuous bushiness of tail. An ample apartment, duly indexed and labelled, as became the rarity of the tenant, was assigned to it, so that it could not only be well seen, but thoroughly examined. Its colours, sober brown and silvery grey, and its fine collar of black velvet edged with white, redeemed its odd figure from the character of vulgarity; but the manner in which it walked was something quite original. Its fore-legs were short, but very stout and muscular, and terminated in enormous claws, which were habitually bent in under the feet, so that the animal rested on their outer surfaces, pretty much in the same fashion (if we may use a homely simile familiar to Londoners), as your maid-of-all-work supports herself on her left knuckles, when she cleans the door-steps.

This was the Great Ant-bear (*Myrmecophaga jubata*), from South America, a harmless creature, notwithstanding its muscular strength. It feeds on ants, and on *termites*, or white ants, as they are called, whose great houses of cemented earth, that are so common in tropical forests, are torn to pieces by these great claws, that the swarming insects may be exposed and devoured. And this last operation is not less singular than other parts of the economy of this creature. Its mouth, long and tubular, is entirely destitute of teeth, but contains a tongue of great length, ordinarily folded on itself, and capable of rapid protrusion to a long distance. When the termites crowd to the broken surface of their nest, as is their custom, the shrewd Ant-bear darts into the midst of them his long tongue covered with a glutinous secretion, and as swiftly draws it back into his mouth, densely covered with the adhering insects.

This curious animal is a fair representative of a group which includes the lowest forms of the true or placental Mammalia — the Class EDENTATA. As Australia is the great centre of the MARSUPIALIA, so South America is the home of the EDENTATA, of which the Sloths and the Armadillos are, after the example just described, the most important living members. But recent discoveries have exhumed from the soil of the same continent other and far more gigantic representatives of the Class, the Megatheriums and Mylodons, the vast bulk of whose bones indicates that their strength must have been as irresistible as their forms were colossal. Professor Owen, who built up, bone by bone, that noble "skeleton of an extinct gigantic Sloth," that stands,—a monument of his skill and knowledge—in the Museum of the Royal College of Surgeons, has given some interesting deductions respecting its mode of life. He concludes that the *Mylodon* — a leaf-eater, like its modern cousins the Sloths of Brazil — having partly exposed the roots of a living tree, by means of its powerful front claws adapted for digging, was accustomed to rear itself up on the broad tripod formed by its own immense hind-feet and its strong tail, and embracing the trunk of the tree with its fore-feet, put forth all its mighty strength in striving to overthrow it. "The tree being thus partly undermined, and firmly grappled with the muscles of the body, the pelvis and the hind limbs, animated by the nervous influence of the unusually large spinal cord, would combine their forces with those of the anterior members in the efforts at prostration. And now let us picture to ourselves the massive frame of the *Megatherium*, convulsed with the mighty wrestling, every vibrating fibre re-acting upon its bony attachment with a force which the strong and sharp crests and *apophyses* loudly bespeak : extraordinary must have been the strength and proportions of that tree, which, rocked to and fro, to right and left, in such an embrace, could long withstand the efforts of its ponderous assailant."

The populous Class of mostly small quadrupeds, known as *Rodentia*, or Gnawers—of which the Rabbit and the Rat are familiar examples—rise but little, in the scale of organisation, above the *Edentata*. They display but little intelligence, have few means of defence, are timid and feeble, and as they are the prey of many enemies, they are preserved from extermination only by their amazing fertility. Their peculiar dentition is, moreover, intermediate between the toothless condition of the Ant-bears and the well-armed jaws of the higher quadrupeds; for they are altogether destitute of *canines*, and their *incisors*, which are separated by a great blank space from the *molars*, are furnished with enamel only on one side. They project from the front of each jaw in a curve; and, as they have no roots, but spring from a pulpy germ deeply imbedded in their sockets, they are continually growing. These peculiarities have a direct relation to the habits of the animals ; for they live upon food, usually hard and solid, which they gnaw away atom by atom, with the tips of these projecting teeth. For this work it is needful that the tips of the teeth, which meet and play upon each other, should have a sharp chisel-like edge, and this result follows from the provision above mentioned, that the hard enamel is confined to the front side of the tooth ; the bony portion of the tip, being soft, wears away more rapidly than the enamel of the front, which thus always presents a sharp cutting edge. The constant growth, too, just balances the ordinary wear of the teeth in eating, so that they are maintained in constant opposibility to each other. The perfection of this balance becomes manifest, when, by accident, one of the incisor teeth is lost; for, in this case, the opposite tooth having no wear, grows out to a monstrous length, maintaining its original curve throughout, and becomes a tusk, which in time presents a bar to the reception of food, and death by starvation ensues.

Strange as it may be thought, there is an affinity by no means obscure, between these minute animals and the greatest of quadrupeds—between the Mouse and the Elephant. Not to speak of the similarity in form of many of their bones, and their jaws formed of parallel laminæ, the latter is, like the former, destitute of canines, while its incisors assume a curved direction, and project from the mouth as great tusks. The molars of the Elephant, like those of the Guinea-pig, are composed of a number of vertical transverse laminæ of bone, each covered with enamel, cemented together by a third substance closely similar to ivory. "This last substance, being much softer than the enamel, wears away faster by the mastication of the food, so that the enamel remains considerably higher, and in this manner the surface of each grinder acquires a ribbed appearance, as if originally formed with ridges. From very accurate observations which have been made on the Asiatic Elephant, it appears that the first set of grinders, or milk-teeth, begin to cut the jaw eight or ten days after birth, and the grinders of the upper jaw appear before those of the lower one. These milk-grinders are not shed, but are gradually worn away during the time the second set are coming forward; and as soon as the body of the grinder is nearly worn away the fangs begin to be absorbed. From the end of the second to the beginning of the sixth year the third set come gradually forward as the jaw lengthens, not only to fill up this additional space, but also to supply the place of the second set, which are during the same period gradually worn away, and have their fangs absorbed. From the beginning of the sixth to the end of the ninth year the fourth set of grinders come forward to supply the gradual waste of the third set. In this manner, to the end of life, the Elephant obtains a set of new teeth, as the old ones become unfit for the mastication of its food."*

In the RUMINANTIA generally the dentition is still incomplete ; the incisors are absent from the upper jaw, the gums forming there a callous pad to receive the action of the lower teeth. Canines are found only in a few families.

It is not until we reach the Unguiculate or Clawed quadrupeds that we see the full complement of teeth. Among the CARNIVORA, for example, both the upper and under jaws are armed with molars, canines, and incisors; the molars terminate in triangular cutting lobes, the canines are stout, conical, and pointed; and the incisors numerous, but small, flattened, and chisel-shaped. And this seems to be the most perfect form of dentition in the Animal Kingdom, that which belongs to a type of organisation in which the characteristic attributes of an *animal* are most fully developed.

Let us, then, examine one of the Cat tribe (*Felidæ*) a little more in detail. How admirably every part of the structure is adapted to one end—the capture and destruction of living active prey—and how thoroughly all the organs, and all the parts of the body, are ancillary to each other ! The feet—the front pair in particular—are armed with five strong, hooked, compressed, sharp talons. These are the weapons principally relied on for dealing the death-blow; it is needful, therefore, that they be kept always clean, pointed, and in order. A beautiful mechanism secures this. Every child knows, who has handled the velvet paw of a Cat, that in its ordinary condition the talons are quite concealed, but that in excitement they are forcibly thrown forward. The last joint of each toe, the tip of which is encased by the claw, is, in rest, drawn back, either upon, or at the side of the preceding joint, by the force of two elastic ligaments. From this position it is in an instant extended, by the contraction of a muscle beneath the toe, the tendon of which passes under the head of the last joint, as under a pulley, and is attached to the base of the claws. When the contraction ceases the claw again springs back to its place, and lies concealed in a deep fold of the skin.

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* Corse, in Brewster's "Encyclop."

The ordinary mode in which a feline animal, from the Lion down to the House-cat, disables its victim is by a sudden powerful blow with the fore-paw. To make this stroke effective, it is necessary that the arm should be moved by vigorous muscles. Perhaps some of our readers may have felt, to their cost, how stinging a blow can be inflicted by the paw of an angry Cat. It has been truly observed, that in the limbs of the *Felidæ* we behold the finest display of muscular development which can be conceived. The dissected arm of a Lion or Tiger is a subject worthy the study of an artist. The muscles are dense, well-knit, short, but peculiarly thick and firm, and they are arranged for flexure or extension, for turning the face of the paw upward or downward, for the forward, lateral, or downward stroke, exactly as they are in man. The Tiger has been known to fracture the skull of a man with one stroke of its paw.

The Cats do not in general pursue their prey by the exercise of speed, but either creep up stealthily towards it until they arrive near enough to make the fatal bound, or lie in wait for its approach. Then, when the keen eye, well practised to judge of distance, esteems the requisite proximity attained, one vigorous bound brings the active murderer full on its victim with prodigious force; the paw, with distended claws, inflicting a violent blow at the moment of descent. For these movements there are peculiar provisions. The lithe and flexible spine, accompanied by the power of the muscles, enables the Cat to throw itself forward with these sudden energetic bounds; while the same properties, combined with the shortness, freedom, and flexibility of its limbs, allow it to crouch close, to creep along with the belly on the ground, as every one has seen the domestic Cat do, when contemplating a mouse, or any other object which awakens her energy. The noiseless tread, also, so essential to the animal's purpose in stealing unperceived on its victim, is provided for, partly by the retractation of the claws already noticed, partly by the soft fur in which the feet are imbedded, but principally by the spongy pads which are seen beneath the toes. These pads have another use, even more important still; for they serve by their elasticity to lessen the shock, which otherwise would ensue to the nervous system, in descending from their vigorous bounds.

The prey being thus slain, or at least disabled, other ordinances of supreme Wisdom become apparent in providing for its appropriation. The teeth, already alluded to, come into requisition. A grinding action is not required; the flesh has merely to be divided into portions sufficiently small to be swallowed, and hence the teeth are all cutters. Look at what from their normal action in other animals we call the *molars;* their summits form lancet-like edges, clothed with the hardest enamel, and the lower ones shut close within the upper. Hence the action of these teeth is exactly that of the blades of a pair of scissors, and the flesh and sinews are divided with the greatest ease and precision.

The sharp and prominent bony *ridges* of the skull, the strength and form of the *zygomatic arches*, and the size of the temporal *fossa*, indicate the immense extent and volume of the muscles that move the jaws, the force of which is increased by the simplicity of the movement required. There is no approach to that lateral working of the jaws upon each other, which we practise when we eat; nothing but a chopping or cutting action, the jaws having only a hinge movement. The muscles of the neck and breast are also particularly large and powerful in the Cats, to enable them to carry off or drag away their prey. A Lion has been seen to bear away a young bullock in his mouth, as a Cat would carry a rat.

During the process of cutting up and swallowing the flesh of the still quivering and palpitating prey, the warm blood flows freely, and this appears to be eminently grateful to the palate of the carnivorous tribes. They frequently pause in the process to lick the flesh, and thus to promote the flow of blood by exposing new blood-vessels. To enable them to effect this, there is an exquisite provision. Every one is aware that the tongue of the common Cat is rough, and that the sensation produced by its licking is that of a rasp or file. This depends on numerous and close-set horny *papillæ*, which project from the surface, the points being all directed backwards. When the Lion or Tiger, therefore, licks the reeking flesh, this structure of the tongue rapidly rasps away the surface. It is brought into action again when the teeth can detach no more flesh from the skeleton, the tongue now rasping off every fragment that adheres to the surface of the bones.

We might pursue this subject into further minutiæ of detail; but enough has been said to show the mutual relation of every part of an organised being; and that, in all creatures, certain definite ends having been prescribed, all the organs are constructed and arranged, like the bands, and wheels, and cranks, and joints of an elaborate machine, to attain those ends in the most complete manner, and with the least possible waste of energy.

We are not writing for Atheists, or we might say with Paley: "The marks of *design* are too strong to be gotten over. Design must have had a designer. That designer must have been a person; that person is GOD." But we perceive more than His entity, more than His foresight; we perceive His benevolence, His care, His tenderness; and these to be so large as to extend to *all* His works. "The young lions roar after their prey and seek their meat from GOD. . . . . These wait all upon Thee; that Thou mayst give them their meat in due season. That Thou givest them they gather: Thou openest Thine hand, they are filled with good. The glory of the LORD shall endure for ever: the LORD shall rejoice in His works."*

P. H. G.

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* Ps. civ. 21–31.

DIVINE THOUGHTS *IN* THE FACTS OF CREATION.

THE PLANETS.*

IF we pass from the central orb to the planets of the solar system, the first thing that strikes us is their complication of movement. The Sun has one motion only,—that on his axis. The planets have each a motion on its own axis, and another motion around the Sun. As the basis of both of these, science recognises a necessity which it yet cannot interpret, the necessity for an original projectile force. Mere attraction would simply have drawn such a body as our Earth to the Sun, and fixed it there, supposing it to have come within his range. Its rotation can be accounted for, only on the principle of an original impetus communicated to it, independently of the Sun. But an original impetus, sufficient to produce that velocity of rotation which it now has, might, according to its direction, have sent the Earth either right into the Sun, or indefinitely beyond his influence, to wander in boundless space. To originate a motion around the Sun, two things required to be calculated and exactly adjusted,—the *force* of the impetus, in other words, the amount of the velocity, and the *direction* of the impetus. The Earth projected into space (science does not, cannot explain how or when), in order to acquire that motion which it actually now has around the Sun, must have been so projected, with a *certain* amount of force and no other, and in one *precise* direction and no other. Thus it must also have been, in like manner, with all the planets. In the case of each, to originate the self-rotation and the vaster circuit around the Sun, the projectile force must have been mathematically precise in its *amount* and in its *direction*. Here, as everywhere, we find ourselves in a region of almost pure thought. We are conversing with matters of nice calculation, with the palpable products of reason, with Divine ideas, with a work which was first ideal and then real, and which has no meaning and no explication, except in connexion with profound thought.

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* In the last of this series of papers the reader is requested to note that the proportions—strictly accurate—two-fifths, half, eleven and a half, six and a half, &c., applied to the size of Mercury, Mars, Jupiter, Neptune, &c., as compared with the Earth, refer not to the *volumes*, but to the *diameters* of these planets respectively.

In the same paper, also, an unaccountable blunder has somehow crept in with respect to the circumference of the Sun, and, in connexion with this, the rate of his velocity. The greatness and obviousness of the blunder, we trust, will effectually prevent it from leading any of our readers into error; and the chosen argument, from outlying *fact* to inlying *thought*, is not in the remotest degree touched by it.

It belongs to the *rudiments* of astronomy that the volume of the Sun is upwards of a million times larger than the volume of the Earth, that his diameter is 110 times that of the Earth, that his circumference is not quite three millions of miles, and that he accomplishes his revolution on his own axis in about twenty-five days. Every child, by the aid of the simplest arithmetic, is able from these data to calculate exactly the rate of the Sun's velocity as compared with that of the Earth.

But there is a still greater complication of planetary movement, which must be noticed. Besides the self-rotation and the course around the Sun which belong to the primary planets, there are many secondary spheres, the satellites, that have a third movement around the orbs with which they are severally connected. Besides the original projectile force, its amount and its direction, besides the complication of movements that has been named, there are several other important elements that enter into the calculation, and that bear immensely on the result—the magnitudes of the planets, primary and secondary, their distances from the Sun and their relative distances from one another, their position, whether in the same or in different planes, their movements, whether in the same or in different directions. It must not be overlooked, that not only are all the planets attracted by the Sun, they are also attracted by one another. Each attracts and is attracted by the others. With these actions and reactions, these various magnitudes, distances, and velocities, it was required to originate a system that should be uniform and permanent. Why, we may ask, are all the planets nearly circular in form? Why, in each case, is the shortest axis that which is chosen as the axis of rotation? Why do they all move, whether on their own axis or around the Sun, in one direction from west to east, as the Sun himself moves? Why do they all move nearly, though not quite, in one plane, forming by their orbits a series of nearly concentric circles? The variations in the case of the minor planets, situated between Mars and Jupiter, need not here be named. With this exception, the orbits of Mercury, Venus, and the other larger planets, are so many concentric circles, the outermost of which is the mighty orbit of Neptune, at a distance of two thousand nine hundred millions of miles from the centre.

It has been triumphantly shown that the existing arrangement possesses the highest advantages over every other that could have been selected. It has been shown, that even a slight deviation in a single case from the actual form of the planets, their magnitudes, their relative distances, their axis of rotation, their velocities, the direction or the plane of their movement, must have given rise to causes which had certainly ended in the derangement and utter destruction of the whole. By the existing arrangement, a system overwhelmingly grand is constituted, which, while its harmony is of surpassing beauty, seems at the same time to be indestructible.

Two mighty laws lie at the foundation of the solar system, and secure its harmony and its permanence—the law of attraction and the law of repulsion. The latter is connected with that primitive projectile force, with which it may be conceived the planets were at first launched into space. This force originates self-rotation, in other words, the tendency of the separate parts of a compressible sphere to fly off, modified by the antagonist tendency to cohere, producing, according to the amount of velocity, an expansion of the equatorial circumference and a flattening around the poles of the axis of motion. On the other hand, and in the same way, this force originates the tendency in the body as a whole to resist and repel every influence that would draw it aside from the direct onward line of motion into which it has been projected. Let us now suppose the Earth, or any other of the planets, speeding its onward course in obedience to the original force that launched it into space, at length suddenly coming within the range of the Sun. His enormous attractive power would tend to draw it completely in to himself. But it is already endowed with a tendency to move right onward in a straight line and to fly off from him. There are thus two forces acting upon the planet, and it is the proportion and balance of these that give it its movement around the Sun, which might, according to circumstances, have been circular, or elliptical, or any one of numberless possible combinations of these. The actual fact of our system is, that the two forces, the one centripetal or attractive, the other centrifugal or repulsive, are so proportioned, that the motion of the planets around the Sun is nearly circular. Each planet is thus, as it were, supported by the combined action of two antagonistic forces, the one drawing it into the Sun, the other urging it every instant to strike off at a tangent, both together keeping it at nearly a uniform distance from the centre. A planet in this view involves profound and intricate calculation; it is a mighty idea realised, a distinct articulate utterance of thought. But the whole together, planets and satellites, in their single, double, and triple movements, with their different magnitudes, distances, velocities, constantly acting and re-acting, yet all preserving a harmony that knows no interruption, what thought, what wisdom do they not embody and reveal?

Of the two laws, on whose adjusted antagonism the harmony and permanence of the solar system depend, an immense amount of influence belongs to attraction or gravitation. This may be said to be the one pervading and reigning force in the material universe. It is the same in our Earth, and in each of the planets, and in the Sun himself,—the same in the atom and in the sphere. Every single particle of matter attracts, and is attracted, by every other. Every combination of particles, small or large, and of whatever form, attracts, and is attracted, by every other combination. One law reigns in a drop of water, the fragment of a rock and the revolutions of the spheres. The force of gravitation acts according to a determinate rule, and its amount is always and everywhere mathematically exact. It is greatest when bodies are immediately near to one another, and diminishes in proportion as their distance increases,—diminishes in a fixed and invariable proportion, the proportion of the squares of the distances. The solar system is governed by this mathematically precise law, and all the magnitudes, distances, orbits, planes, and forms of the planets, are adapted to it with critical exactness. So much is this the case, that La Grange has shown that, but for the very ratio in which the law of gravitation acts, the inverse ratio of the squares of the distances, by a deviation ever so slight, fatal derangement was inevitable. But it is not meant to be conveyed that there are no apparent imperfections and irregularities in the existing planetary system. It is certain, on the contrary, that changes have occurred, and are occurring; for example, in the eccentricity of the Earth's orbit, in the velocity of the Moon's motion, and in the obliquity of the ecliptic, which may be conceived to affect the permanence of the economy. The question is perfectly legitimate: Is there no likelihood that these or other changes may yet prove fatal? "It was shown by La Grange and La Place, that the arrangements of the solar system are stable, that in the long run the orbits and motions remain unchanged, and that the changes in the orbits which take place in shorter periods never transgress certain very moderate limits. Each orbit undergoes deviations on this side and on that of its average state; but these deviations are never very great, and it finally recovers from them, so that the average is preserved. The planets produce perpetual perturbations in each other's motions, but these perturbations are not indefinitely progressive: they are periodical, they reach a maximum value and then diminish. The periods which this restoration requires are, for the most part, enormous; not less than thousands, and in some instances millions of years, and hence it is that some of these apparent derangements have been going on in the same direction since the beginning of the history of the world. But the restoration is in the sequel as complete as the derangement, and in the meantime the disturbance never attains a sufficient amount seriously to alter the adaptations of the system."

"The same examination of the subject by which this is proved points out also the condition on which the stability depends. 'I have succeeded in demonstrating,' says La Place, 'that whatever be the masses of the planets, in consequence of the fact that they all move in the same direction, in orbits of small eccentricity and slightly inclined to each other, their singular inequalities are periodical and included within narrow limits; so that the planetary system will only oscillate about a mean state and will never deviate from it, except by a very small quantity. The ellipses of the planets have been, and always will be, nearly circular. The ecliptic will never coincide with the equator, and the entire extent of the variation in its inclination cannot exceed three degrees.'

"There exists, therefore, it appears, in the solar system, a provision for the permanent regularity of its motions, and this provision is found in the fact that the orbits of the planets are nearly circular, and nearly in the same plane, and the motions all in the same direction; namely, from west to east."—(Whewell's "Astronomy," pp. 163, 164.)

It admits of no denial that the solar system is, in every view, a product of reason, in which no contingency has been overlooked, and whose very seeming imperfections arise from causes which actually go to secure its permanence and indestructibility. To such an extent is it a work of reason, an embodiment of thought, that the human mind has actually discovered some of the substantial material facts of that system, by following out the train of its own ideas. One striking example may here be adduced.

The discovery of the planet Neptune was as much the result of reasoning as of observation. Certain apparent irregularities were found in the orbit of Uranus, which could not be accounted for by any of the then known conditions of the planetary system. Monsieur Le Verrier conjectured that these irregularities might be caused by the attraction of some planet as yet undiscovered. From these irregularities he calculated what must be the orbit of a planet that should produce them, and he actually predicted where such a planet must be found on a certain day. The planet Neptune, a full third larger in diameter than Uranus, and six and a half times than our Earth, was discovered.

The thoughts of God, uttered in the facts of creation, man is able to interpret, sometimes even to anticipate. With the page before us, on which the ideas are written out, even anticipating their current and verifying our anticipations, we worship the Great Thinker. QUÆRENS.

LEAVES FROM THE LINDEN GROVES.

GERMAN LAYS TRANSLATED.

"TAKE ME."

TAKE me,
Faithful Saviour, as I am;
Make me
Of Thy pure flock a lamb.
As I spoke
A sweet "Amen" awoke:
My heavy chain of sin and sorrow broke.

DE LA MOTTE FOUQUÉ.

PARTING.

What mean ye thus to weep,
And grieve my saddened heart?
In God we one must keep,
In Him we need not part.
The band which us hath bound
Heeds neither time nor place,
Who in the Lord is found
Aye sees his Father's face.

Man reaches out the hand
A long farewell to say,
And yet that union band
Obliges him to stay.
Man looks upon another
With a last long sigh and tear,
And yet that parted brother
In God is just as near.

Why should our tears flow down,
Our hearts so sadly beat?
We know so well the One
In whom we all can meet.
Under one Eye we stay—
We're led by one dear Hand,
In one secure, straight way,
Unto our fatherland.

Let not this hour be viewed
With parting's heavy pain—
But be our vow renewed
With our dear Lord again.
While prayer to heaven can wend,
And Jesus' face we see,
Friend is not lost to friend,
Though bitter parting be. SPITTA.

EVENING.

The sun sinks in the west,
The stilly night is come;
My weary body rest,
Thy day's work is all done.

But thou, my soul, O fleet
Mount up from earth's dark sod;
Soar to thy rest so sweet,
The bosom of thy God;—

Thy God, whose kind love fills
Those gold-bright, glorious lands,
Where o'er these darkening hills
The heaven wide open stands. STURM.

PASSING AWAY.

I'd like to pass from hence, like the deep glow of eve,
  Like the sweet day whose dying scarce we see,
Till gathering darkness round us we perceive,
  And know it softly passed into eternity.

I'd like to pass from hence, like the mild, cheerful star,
  In glowing love and radiance calmly bright,
So gently and so sweetly travel far
  Through the deep, stilly blue, to God's own throne of light.

I'd like to pass from hence, like the sweet scent of flowers,
  So joyous wafted from the lovely cup,
An incense from earth's beauty-beaming bowers,
  Borne by the wingèd winds to God's high altar up.

I'd like to pass from hence, like the sweet victory tone
  That from a harp-string joyfully forth-springs;
Scarce has the sound from the trembling metal flown,
  When in its maker's breast the welcome music rings.

—Thou wilt not pass away like evening's fading hour,
  Thou wilt not gently vanish like the star;
Thou wilt not die the light death of a flower,
  And from thy struggling soul may victory songs be far.

Thou'lt gently pass away—without a pang, away!
  For first thy wonted strength shall thee forsake;
Alone in Nature is such sweet decay,
  And to eternal life thou'lt gradually awake.

And thou wilt pass from hence like dew at early morn,
  On which the thirsty sun so joyfully doth gleam.—
Then come, Soul-Sun, my Jesus, quickly dawn,
  And draw my weary spirit up into thy beam.

HERWEGH.

THE FATHERLAND.

Know ye that land?—It lies not on this earth,
And yet it is the bright land of our birth;
There sounds no sigh, there flows no bitter tear,
The land of light unto our heart so dear.
Know ye it, then?—Away! away!
Press on, O friends, unto eternal day.

Know ye the way?—the rough and thorny road,
Where sinks the traveller 'neath his pressing load,
And sinking, cries, "Thou, Father, God of love,
Cut short my way, O bring me there above!"
Know ye it, then? Its gloom, its gloom,
Fades into light where heavenly pastures bloom.

Know ye the Friend?—He is a child of man,
Yet more than thousand friends he succour can;
He goes before o'er the rough path of thorn,
And aids the pilgrim wearied and forlorn.
Know ye Him, then?—His hand, His hand,
Guides still and surely to the fatherland.

HANS CLAUS.

EVENING ASPIRATION.

I stood upon the mountain's height
  When home the sun was wending,
Its softened glow of golden light
  The evening's glory lending.

In dew to earth had dropped
  Heaven's peace so still and deep,
The vesper-bell, just stopped,
  Had lulled the vale to sleep.

I spoke, O heart, conceive
  This stillness sweet and blest;
Content, thy cares now leave,
  Give up thyself to rest.

Each flower its eye doth close
  In stilly evening dream;
More slow and gently flows
  Each ripple in the stream.

The kindly zephyrs rock
  The birds in cradled nest;
The shepherd with his flock
  Slow seeks his nightly rest.

The golden beetle sleeps
  Bedded in rose-leaves' glow;
In forests dark and deep
  Are resting stag and roe.

He who a home doth own
  The lovely rest may share;
He who far wandereth lone,
  On dream-wings fleeth there.

Deep longing holds my soul
  At such an hour as this,
To mount and reach the goal
  Where my dear homestead is!

RÜCKERT.

EVENING WORSHIP.

How lovely the evening hour,
  How smiling departing day,
How sweetly the birds are singing
  On their longing nestward way!

The bright flowers must silent be,
  To them is no voice allowed;
Yet in quiet prayer to their God
  Their heads to the earth are bowed.

'Tis quiet evening worship
  Where'er I gaze or roam,
Soft on the waters is painted
  The beautiful heaven's dome.

And all things living sing
  One holy, peaceful lay;
And all things now plead so gently,
  "Man! thou must also pray."

SPITTA.

EVENING PRAYER.

Now is the day flown by,
  And darkly sleeps the earth,
Upon the deep grey sky
  Each sparklet has new birth.

On yonder young green branch
  Pours forth the nightingale,—
The only sounds that launch
  Across the silent vale.

And I, O Father! stay
  Before my cottage-door,
Mine eyes in rapture stray
  O'er thy bright palace-floor.
Oh, would that I could sing
  Clear as the nightingale,
That to Thine ear might ring
  My want and sorrow-tale.

Yes, yes, a sorrow-tale—
  For as the dark night nears,
My trembling heart doth quail,
  Within spring wells of tears;—
Of tears and sighing wrung
  From out this heart of stone,
Griefs neither said nor sung,
  But, Lord, to Thee well known.

Thou know'st the sorrow-tale
  That makes me seek the sky,
When 'neath sweet slumber's veil
  The weary world doth lie;—
Know'st 'neath what heavy load
  My heart heaves there above,
And pleads a shortened road
  Or quickening from Thy love.

Yes! from Thine own sweet love,
That heals my bitter smart;
Yes, yes, Thine own sweet love,
That stills my wringing heart.
That beam dispels in tears
The ice within my breast,
The troubled waters nears,
And bids them be at rest.

Ah! why should I complain
When that dear love is nigh,
And why should I be fain
T' escape the world and die?
No, Jesus; I will trust
In Thy sweet precious blood,
In that I will and must
Be reconciled with God.

O Jesus, spread Thine arms,
And take me to Thy breast;
There vanish these alarms,
There can the tired one rest!
I'll lay me down to sleep,
Still resting on Thine arm,
Assured that Thou wilt keep
Thy child from every harm.

ARNDT.

THE HEAVENLY SUITOR.

A holy love-song hath been sweetly sung
In yonder time so grey,
Through thousand years its sound hath rung,
And rings to-day.

Of such a love speaks the sweet, swelling sound
As loves unto the last;
It loved me, too: even me it found,
And still holds fast.

My woes and cares all fled in Heaven's bright rays,
Which pierced my heart's chill sod;
On thee I fixed my wondering gaze,
Thou Son of God.

Thou saidst, "For thee I bled, was crowned with thorn,
Suffered derision's smart,
And such a death as none hath borne,—
Give me thine heart."

And is it for this worthless heart of mine
Thy endless love doth call?
Oh, that it ever had been thine!—
Lord, take it all.

P. F. STRAUSS.

OURSELVES.

THE CIRCULATION OF THE BLOOD.

UNTIL the time of our illustrious countryman, Harvey, the blood was thought to undulate rather than to circulate.*

He sagaciously inferred from the construction of the floodgates in the Heart, their position, and seeming uses, and from the structure and seeming uses of the valves in blood-vessels, that the blood could not ebb and flow; that there could be no waving of it backwards and forwards in the same vessels, but that it must perform a real circuit through the whole vascular system.

His theory of the circulation, founded on those inferences, and on the conclusions deducible from them, though greatly ridiculed and impugned at the time, is now acknowledged to be the true explanation of the function.

The *Heart* is the centre of the Circulating System. It is a hollow, muscular organ, of a pyramidal or conical shape, and lies obliquely across the middle of the chest, between the lungs, with its apex inclined forwards, outwards, and downwards, towards the sixth rib on the left side.

Its medium weight is about eleven ounces for a man, and nine for a woman.†

The arrangement of the muscular fibres of which it is chiefly composed is regularly irregular. They form three strata, connected more or less with one another, and with four membranous zones by which the whole organ is encircled.

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* Unless the expression "the wheel broken at the cistern," implies the Circulation, and that Solomon was acquainted with it. In his "Portraiture of Old Age," which is a clever and interesting commentary on the 12th chapter of Ecclesiastes, Dr. Smith renders it very probable, if he does not prove, that such is the meaning of the passage.

† Disease greatly modifies these numbers. It has been found weighing as little as two, and as much as twenty-eight ounces.

A membranous bag, called by anatomists the *Pericardium*, which varies a good deal in thickness, and which is thin and transparent where it is in immediate contact with the heart, but elsewhere strong, opaque, and compact, envelopes and adheres closely to its outer surface. By this it is attached, and in some degree fixed, at its base, to the parts in the immediate neighbourhood. Being reflected off from these, and from the base of the heart, it forms a sac, in which the heart lies free and disengaged, as the head does in the outer duplicature of a double nightcap.

There is always a small quantity of fluid, commonly from one to four ounces, in this sac, termed the *Liquor of the Pericardium*, by which the surfaces are kept moist and free from irritation. Increased, as it sometimes is, by disease, it occasions *Dropsy of the Pericardium.*

The interior structure of the heart is somewhat elaborate. It contains four cavities; two of which are called *Auricles*,* the others *Ventricles*.† The auricles occupy the base, the ventricles make up the body or cone of the heart. An auricle and a ventricle form its right, and an auricle and a ventricle its left side; or, almost as properly, form the right and left hearts; for we are really double-hearted. On each side the auricle communicates directly with its corresponding ventricle, but only indirectly and circuitously with the other cavities. In each of the cavities are found bundles of fleshy fibres, called *Carneæ Columnæ.* They are more numerous in the auricles than in the ventricles, and on the right than the left side of the heart. They seem to strengthen and support its walls; and are irregularly placed.

A smooth membrane, consisting of two tolerably distinct layers, lines the inner surface of the cavities, and also covers the *carneæ columnæ*. Folded upon itself, and shaped to suit the forms of the different openings, the innermost layer makes the *Valves*, by which the distinctness of each cavity is preserved, and by which the blood is prevented from returning, when once it has entered into any of the cavities.

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* From some resemblance to the flap of a dog's ear.

† *Venter*, the belly or body of the organ.

The heart has its own special blood-vessels. Its Lymphatics are very numerous and distinct.

The nerves with which it is supplied are small in reference to the size of the organ; and they are neither nerves of volition or feeling. They are derived from the Great Sympathetic, and from those which are also distributed to the lungs and stomach. Hence, happily, the heart is very insensible* except to its own proper stimuli; and not under the influence of the will.†

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* "The observation of the admirable Harvey is to this effect. A noble youth of the family of Montgomery, from a fall and consequent abscess of the chest, had the interior so marvellously exposed, that after his cure, on his return from his travels, the heart and lungs were visible and could be handled; which, when it was mentioned to Charles I., he expressed a wish that Harvey should be permitted to see the youth and examine his heart. 'When,' says Harvey, 'I had paid my respects to this young nobleman, and conveyed to him the king's request, he made no concealment, but exposed the left side of his breast, when I saw a cavity into which I could introduce my fingers and thumb; astonished with the novelty, again and again I explored the wound, and first marvelling at the extraordinary nature of the cure, I set about examining the heart. Taking it in one hand, and placing the finger of the other on the pulse of the wrist, I satisfied myself that it was indeed the heart which I grasped. I then brought him to the king that he might behold and touch so extraordinary a thing, and that he might perceive, as I did, that unless when we touched the outer skin, or when he saw our fingers in the cavity, this young nobleman knew not that we touched his heart.'"

† The only known exception to this otherwise inviolable rule is the remarkable case of Colonel Townshend, detailed by Dr. Cheyne in his "Treatise on Nervous Diseases," who, with Dr. Baynard and Mr. Skrine, were attending on the Colonel for an affection of the kidneys by

The heart is constructed to dilate and contract. These are its natural and proper movements, and by them its functions are fulfilled. They are called by physiologists its *Diastolè* and *Systolè*, and occasion what is commonly known by the term *Pulsation*.

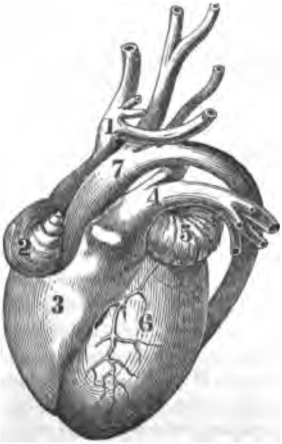
Very many circumstances cause differences in the number of pulsations in a given time. As general rules, the pulse is more frequent in women than in men; in short than in tall persons; and slower in cold than in warm climates. Its frequency varies greatly with age. A newborn infant's pulse beats 136 times in a minute; towards the end of the first year, 124 times; the second, 110 times; third and fourth, 96 times; fifth, 88 times; ten to fifteen, 78 to 80 times; manhood, 70 to 75 times; at sixty, 60 times.

All febrile excitement increases its frequency. It is slower when we lie down, than when we are sitting; and as might be expected, therefore, it is quickened by standing.

which his health was impaired and his life endangered. "He sent for us one morning," says Dr. Cheyne, "to give us some account of an odd sensation, he had for some time observed and felt in himself; which was, that composing himself *he could die or expire when he pleased, and yet by an effort, or somehow, he could come to life again.*" He insisted so much on their seeing him make the trial, that they were at last forced to comply. "We all three felt his pulse first," continues the Doctor; "it was distinct, though small and thready, and his heart had its usual beatings. He composed himself on his back, and lay in a still posture for some time; gradually his pulse sunk and could not be felt; his heart ceased to beat; and he did not breathe; nor was there any discoverable symptom of life remaining." In this state he continued for half-an-hour, and they were about to leave him, supposing he was dead; when observing some motion about the body, they found his pulse and the motion of his heart returning; he began to breathe gently and to speak softly, and before long he had recovered from this most singular condition. "He afterwards called for his attorney, added a codicil to his will, settled legacies on his servants, received the sacrament, and composedly expired in the evening. Next day he was opened (at his own request). His lungs were fair and sound, and his heart big and strong."

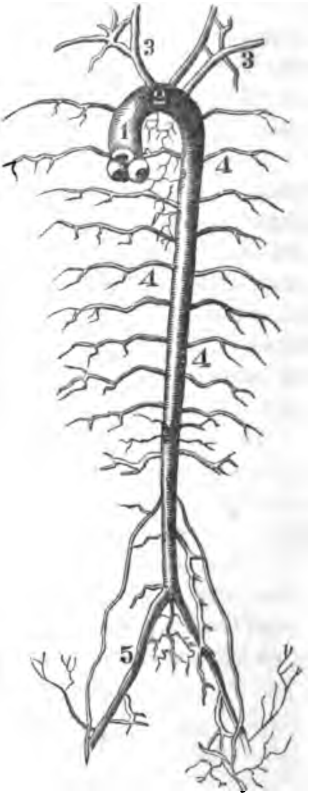
It is also quickened by food, by stimulating drinks, by mental excitement, by muscular efforts, by heat, and probably by a diminution of atmospheric pressure. It is always slower during sleep. Old age does not seem, proportionately, to retard it. Some persons have preternaturally slow, others quick pulses. Dr. Fordyce mentions having seen a healthy man whose pulse only beat twenty times in a minute.

At every stroke of the heart, at each systolè, about two ounces of blood are delivered from each of the ventricles into the large vessels which proceed from them—into the *Aorta*, which arises from the left ventricle, and conveys the blood into the system, for general purposes; and into the *pulmonary artery* from the right ventricle, by which it is carried to the lungs, for special purposes. During their expansion, during the diastolè of the ventricles, the blood is admitted into each from its corresponding auricle, where it has just before been received from the system and from the lungs. In each case its regress is prohibited by suitable valves. Its course will, perhaps, be better understood by reference to the accompanying sketch of the Heart and the vessels connected with it. No. 1, indicates the veins, the *venæ cavæ*, by which the blood returns from the general system, terminating in No. 2, the right auricle. No. 3, the right ventricle; whence arises No. 4, the pulmonary artery, through it the blood passes to the lungs, and returns by four *pulmonary veins*, not shown in the drawing, to No. 5, the left auricle. The left auricle delivers it



into No. 6, the left ventricle; out of which springs No. 7, the *aorta*, the main trunk of the vessels by which it is distributed over the whole system.

Thus the double heart fulfils a fourfold function, like two forcing-pumps acting simultaneously. It first derives the blood from the general system, and then forwards it to the lungs; again inducing its return from the lungs, it diffuses it through the system.



The vessels which convey the blood from the heart are called *Arteries*.* It is brought back by the *Veins*.

The *arteries* are strong, compact, very elastic, muscular tubes. Directly or indirectly, those which supply the general system arise from the Aorta. Its course is shown tolerably well in the annexed diagram, and how the subordinate branches originate. No. 1 points to the orifice of the aorta, by which it communicates with the heart. Three crescent-shaped valves most accurately close this opening. They are shown, a little exaggerated, in the sketch. No. 2 is the arch of the aorta, whence arise Nos. 3 3, the vessels which go to the head and upper extremities. Nos. 4 4, the arteries which supply the walls of the chest, the viscera of the abdomen, &c. &c. No. 5, the division of the aorta into two branches, which again subdivide, to supply the lower extremities.

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* The term is derived from two Greek words signifying air, and to carry. Being always found empty after death, they were supposed to be aëriferous tubes.

During their course, the arteries frequently communicate with one another, or, as it is technically termed, *anastomose*, by collateral branches; so that if any particular vessel is obstructed, the circulation is not, on that account, interrupted. The minute divisions into which they ultimately separate are called *Capillaries*, which pervade every part of the body where a supply is needed.

The blood is brought back to the heart by the *Veins*. These are not mere counterparts to the arteries, but are larger and more numerous. Their structure also is different, and so are their functions. Their coats are thin, not muscular, and not very elastic. They ramify much more than the arteries do, and are more irregular in their course and divisions. Another distinction is the beautiful supply of valves, with which they are plentifully furnished, and which open only towards the heart.

The communication between the capillaries in which the arteries terminate and those by which the veins begin, though not clearly seen in the human person, is beautifully shown by the microscope in the transparent membranes of frogs and fishes. The little branches successively join, and form larger vessels, which ultimately unite into two main trunks, called the *Venæ Cavæ*. These pour their accumulated contents into the heart. P. S.

CANDLES AND LAMPS.

(Continued.)

1. *Rape-oil* is found in the small, round, dry seeds of the winter and summer rape (*Brassica napus*), associated with mucus, albumen, &c. The seed is better when kept for some time, as it then contains less of the injurious constituents, while the albumen is more easily rendered insoluble, when subjecting the seed to heat.

The mode of obtaining the oil varies somewhat in different localities. The hard integument of the seed is first broken between cast-iron rollers, and the crushed seed is reduced to as fine a powder or flour as possible, beneath ponderous, granite edge-stones. This flour is then heated by means of steam in close vessels, and afterwards put into woollen cloths, which are wrapped in horse-hair bags. These bags are subjected to enormous pressure in hydraulic presses, or in the old Dutch mills or wedge-presses. In the former the power exerted is equal to four hundred tons distributed over the surface of the pressing slab.

The produce of oil varies from 25 to 50 per cent, and requires to be purified, which is termed *Clarification.* The plan most generally adopted depends upon the peculiar action of sulphuric acid; which first removes the water from the mucus, by which it was held in suspension in the oil, and then chars the mucus itself to a black mass. The impurities are now removed by filtration, and the last traces of the acid separated by washing the oil with water and milk of lime. Watt has proposed the use of oxidising agents, as chromic acid; and Cogen, a solution of the caustic alkalies, but neither plan has been generally adopted.

The oil of the Colza (*Brassica oleracea*), a variety of the common cabbage, also much grown in the south of Europe, is obtained from its seeds in a similar manner. In France this oil has been adopted for all the purposes of light-houses, and has lately come into extensive use in this country for the Moderateur Lamps.

2. *Olive oil.*—The olive-tree (*Olea Europæa*) produces a stone fruit, the fleshy, greenish-brown integument of which contains an oil, exceeding all others in sweetness. The tree is a native of Asia, but grows luxuriantly in Southern Europe; they begin to bear fruit in five years, and continue productive for a century, and sometimes longer. The more common kinds only are used for burning. The fruit is allowed to undergo a kind of fermentation, and after being bruised under edge-stones, it is placed in rush sacks, and subjected to pressure in a kind of wine-press. The first runnings are termed the *virgin oil*, and that still left behind in the cake is obtained by digesting the dry residue in water and again submitting it to pressure. This process is repeated two or three times.

Gallipoli is one of the principal ports whence olive-oil is exported, and large tanks are constructed in the rock on which the port is built, where the crude oils are collected as they arrive in skins from the interior. The mucus is here deposited, and the oil becomes clear and bright.

It already forms an article of export from Chili, and the tree grows to a great height in Australia.

3. *Palm-oil* is a vegetable fat extracted from the fruit of a kind of palm, the produce of the tropical parts of Africa, south of Fernando Po. The history of the introduction of this article into commerce, is interwoven with the suppression of the accursed traffic in slaves; and amid our many short-comings as a nation, that point is peerless in the past, when Parliament voted twenty millions to restore to our

black fellow-subjects the birthright of which we had deprived them,—

> "And taught the world that while she rules the waves,
> Her soil is freedom to the feet of slaves."

Instead of a fleet of slavers waiting for their quivering, living freight of immortal beings at the mouth of the *Bony River*, our Liverpool merchant-princes traffic with the produce of our looms and forges for shiploads of this, thus doubly, interesting palm-oil.

A generation ago, there was no property in palm-trees in Africa, but now *plantations*, as they are called, attract attention, and lately the title to some has been disputed in our courts on the Gold Coast, once the seat of a flourishing slave-trade. Thus, the feeling of property, and the desire of accumulation, show that the germs of nascent civilisation are springing forth from the labours of those philanthropic and Christian men who have passed to their rest.

Although somewhat foreign to our present subject, we cannot refrain from expressing the wish, that England had done, or would do, something to assist her children across the Atlantic in the present extremity of their history, arising out of their domestic institution—in reality, the fruit of a legacy left them by this country. We have lately spent not far short of one hundred millions sterling in the work of destruction: how much more glorious to present the Americans with a similar sum,—to help to redeem their slaves from bondage, free their escutcheon from the foul blot, and cement our national amity for a thousand generations.

The fruit of the palm is of the form and size of a pigeon's egg, of a golden-yellow colour, containing a hard stone, inclosed in a fleshy integument. This fleshy portion is bruised and boiled with water, when the oil separates on the top, and can be easily collected. It solidifies to the consistence of firm butter, assuming the appearance of a reddish-yellow fat, and should be more properly called *palm butter*. It has a strong aromatic smell; but in commerce, is in a rancid state. Its characteristic constituent is *palmitic acid* in combination with glycerine, forming *palmitin*.

Various plans are employed for *bleaching* this oil: Davidson uses a solution of chloride of lime, or a mixture of oxide of manganese, common salt, and sulphuric acid. The carbonic acid of the air, in the former case, separates the chlorine, which is produced at once by the chemical action of the latter materials. Michaelis merely uses oxide of manganese and sulphuric acid, trusting to the liberation of the nascent oxygen for the bleaching action. Zier, again, melts the palm-oil by means of steam, and allows it to fall through a column of air in towers constructed for the purpose, when the colour is removed by the joint action of air and heat. This process has been further modified, by exposing the melted oil in shallow cisterns to the bleaching action of air and light. Lastly, Watt employs a mixture of bichromate of potash, common salt, and sulphuric acid. The sulphuric acid decomposes both the other substances, liberating chromic acid, half of whose oxygen destroys the colouring matter, while the residual oxide of chromium is dissolved by the muriatic acid, simultaneously disengaged from the common salt. The water thus holds all the products of the process in solution, and allows the bleached palm-oil to be removed from its surface without difficulty. A substance often confounded with this oil, called *Galam, or Thea butter*, is very similar in appearance and properties, and also comes from Africa. Another oil, but less known in commerce, is also very similar to the above, both in its origin and nature, called *oil of Illissa*, and is obtained from the fruit or seeds of trees growing on the coasts of Coromandel and Bengal.

4. *Cocoa-nut Oil, or Butter*, is extracted from the ker-

nels of the cocoa-palm, either by pressure or boiling. This palm is indigenous to the two Indian Peninsulas, and it is also found spread over immense districts in the Brazils. The kernels, called in commerce *Copperah*, are brought to this country, cut into pieces, heated, and submitted to pressure in the usual way to extract the oil, the produce of which amounts to 60 per cent.

5. *Vegetable Tallow of China.*—This white sebaceous substance envelopes the seed in the nuts of the *Stillingia sebifera*, which is cultivated in several provinces of China. The nuts are pounded in a mortar to loosen the seeds, and are then steamed in tubs with open, convex wicker-bottoms, placed over caldrons of boiling-water. When thoroughly heated, they are reduced to mash in a mortar, and transferred to bamboo sieves kept at a uniform temperature over hot ashes. This operation is repeated. The produce becomes a solid mass on falling through the sieves, and is purified by re-melting and a rude process of pressure. It is a hard, brittle, white, opaque, and tasteless tallow, but without any odour, and may be considered as nearly pure stearine. The oil (*elaine*) is obtained by pressure from the kernel, and is in common use for lamps.

The candles are made from this vegetable tallow.

6. *Resin.*—This substance is obtained from the sap of the *Coniferæ*, or fir-tribe, particularly from the genus *Pinus*, in which it is partly held in solution by a volatile oil, and partly produced from the latter by oxidation on exposure to the air. North America is the chief source of resin, where it is procured by making incisions in the trees in spring, when the sap is in motion, and collecting the resinous juice. A white matter is at first collected, which is employed in making flambeaux instead of white wax. The juice which exudes afterwards is strained through a basket, in which the thicker portions may remain. The filtrate is sold as

common turpentine, and the rest is distilled with water as long as any oil passes over, leaving a yellow or dark-coloured residue. The product is *oil of turpentine* or *turps*, and the residuum is *resin* or *colophony.*

The oil of turpentine is a carbo-hydrogen (C_{20} H_{16}), and the resin a mixture of two acids, called *sylvic* and *pinic*, having the same ultimate composition (C_{20} H_{15} O_2).

The different varieties of turpentine of commerce are distinguished from each other by the different proportions of oil and resin they contain. Some have an agreeable odour, as *Canada balsam;* and that from Barbary affords a highly aromatic body, called *China turpentine;* while the *Abies communis* yields *frankincense.*

The yellow or brown colour of resin depends upon the extent to which the distillation has been carried, and the dark colour of colophony is owing to the conversion of part of the pinic acid into *colophonic acid.* The substance known as *cobbler's-wax* is a fused mixture of colophony, and a variable quantity of pitch.

When the crude oil of turpentine is distilled with potash, afterwards with water, and finally with chloride of calcium, a perfectly limpid, colourless oil is obtained, of a peculiar odour, and burning taste. It burns with a white flame and much smoke, and requires a particular arrangement in the wick and burner for perfect combustion. It has the same ultimate composition as the oils of lemon, orange-peel, bergamot, pepper, juniper, laurel, &c. (C_5 H_4), and muriatic acid combines with it, forming *artificial camphor.*

7. *Naphtha and Paraffine.*—The liquid hydrocarbons found in various localities, derived from the slow decomposition of the carboniferous strata, are sometimes employed for street-lighting in lamps. The streets of Genoa, for instance, are lighted with the naphtha from a neighbouring spring at Amiano. Among the secondary products in the

manufacture of coal-gas, there are several very suitable for consumption in properly-constructed lamps.

The residue, after distillation of the more volatile fluids in coal-tar, is called *Pitch, or Dead Oil,* to burn which a lamp was invented by Mr. Beale; but we allude to it here as the source of the remarkable substance called *Paraffine.* After being twice distilled, and steam driven through the product to expel the naphthaline, the oil is mixed with sulphuric acid and thoroughly incorporated in a kind of churn. The oil is washed with water, after the acid has been removed by subsidence, and then churned with caustic alkali. Again, washing and distilling, until the products are obtained pure, the paraffine is at last procured by submitting them to cold, when it crystallises. These crystals are purified by pressure and a repetition of the above processes.

The solid substance thus obtained is admirably adapted for making candles, some of which were exhibited in the House of Lords by the Earl of Shaftesbury, when alluding to the prospect they held out of converting the Bogs of Ireland into a source of occupation and wealth for the inhabitants of the Emerald Isle. It contains only carbon and hydrogen, and has the same composition in 100 parts as olefiant gas, to which our coal and oil gases owe so much of their illuminating power. How nearly has Young realised the problem which the rare sagacity of the distinguished German chemist, Liebig, pointed out nearly ten years ago in his "Familiar Letters," where he says, "It would certainly be esteemed one of the greatest discoveries of the age, if any one could succeed in condensing coal-gas into a white, dry, solid, odourless substance, portable and capable of being placed on a candlestick, or burned in a lamp." We believe that our prolific science of chemistry justifies us in looking forward to the time when we may see on our tables the *white solid coal-gas candle.*

There are numerous other plants yielding oils, butters, and wax, but which have not yet attracted much attention, and which we must omit from so brief a sketch as the present survey of the vegetable products employed for lighting, either as candles or in lamps, but proceed to those having their origin in the animal kingdom.

8. *Train Oil.*—What associations cluster round the locality whence this oil comes,—the stirring scenes of the skill and dauntless courage of our seamen, as they pursue the huge leviathan of the deep, amid icebergs and billows, —a locality, too, which has proved the grave of the noble Franklin with his companions in misfortune.

"Where sleep they, Earth? By no proud stone
Their narrow couch of rest is known;
The still, sad glory of their name
Hallows no mountain unto Fame;
No!—not a tree the record bears
Of their deep thoughts and lonely prayers.

Yet what if no light footsteps there
In pilgrim-love and awe repair:
So let it be!—like him, whose clay
Deep buried by his Maker lay,
They sleep in secret,—but their sod,
Unknown to man, is marked by God!"

The east shores of Greenland, Davis' Straits, the interior of Baffin's Bay, and the newly-discovered inlets and seas of Collinson and M'Clure, are the seats of the Northern whale-fishery. It is unnecessary to detail the capture of the whale and the packing of the blubber in casks, in which an incipient decomposition of the animal matter attached to the blubber takes place during the voyage. This decomposition occasions the formation of a peculiar fat, composed of *phocenic acid* and oxide of glyceryle, to which is due the nauseous odour accompanying all train-oil. The cellular tissue is thus so disintegrated that the oil runs off at once, and the whole is emptied into casks with wirework bottoms. When heated to 212°, the impurities in suspension separate more easily. They do not consist of mucus, but animal gelatine or glue, and some volatile stinking matter. Instead of heat, it has been proposed to employ tannin or metallic salts to precipitate them, but the nauseous odour is best removed by bleaching-powder.

On the western coast of Ireland, the basking shark is captured, and a large quantity of excellent oil obtained from the blubber.

9. *Seal-oil* is one of the most important productions of Newfoundland. The *pelts* of the seal, consisting of the skin and fat which surround the whole body, are removed while the animal is warm. They are allowed to cool on the deck, and then stowed away in the hold, in which state they reach the shipping ports, the principal of which is St. John's. The fat is removed by the hand from the skins, which, after being dry-salted for about a month, are shipped to Europe.

The fat is thrown into large vats, and the pressure of the mass gradually forces the oil through apertures in the sides. The first runnings are clear and possessed of little smell; they are termed *Pale Seal-oil.* Decomposition sets in at the end of two or three months, by which time from 50 to 70 per cent of the whole produce has been obtained. The whole putrid mass is turned, the upper portion of one vat being thrown to the bottom of another, and a brown oil of a most offensive character is produced. When the brown oil ceases to run, the contents of the vats are boiled in large iron pans, and the produce of this last operation is called *boiled seal-oil.* Mr. Archbold has introduced some important improvements in *rendering* seal-oil, by which the time necessary for the operation is reduced from six months to about twelve hours.

10. *Tallow.*—In the animal body there exists a peculiar

skin-like tissue, filling up the interstices between the different organs and surrounding them in all directions, which is called the *cellular tissue.* In certain places in the caul, for instance, the single cells are loaded with the fat, which, in the form of small drops, swims in the animal fluid, with which the cells are filled.

In ruminating animals, the firm, and at ordinary temperatures, solid nature of the fat, is characteristic. Ox-tallow was, until recently, the only source of lighting material; but Australia now exports a large quantity of mutton-tallow. The cattle fed on dry fodder yield the most solid tallow, which is one reason of the superior quality of that which comes from Russia.

The melting and purification of tallow are generally accomplished by the agency of heat alone. The cells burst by the expansion of their fluid contents,—the particles of skin appear hard and baked, and by moderating the heat the fluid fat collects at the top, when it is removed and pressed into blocks. The residue after pressure, called *greaves,* is used for feeding dogs. Many objections exist to this mode of rendering tallow, from the impossibility of maintaining a uniform heat and the evolution of inflammable animal matters. D'Arcet suggested the employment of weak sulphuric acid, which, by means of steam, applied externally as a source of heat, or internally among the melting mass, is perfectly successful. Morfit speaks well of an American plan used by Wilson and Co., who employ steam of high pressure.

But the most of the tallow of commerce cannot be used by the candle-makers without being purified, which process is called *clarification, or rendering.* It consists simply in re-melting the tallow with some clarifying substance, which seems to vary with each locality, for saltpetre, sal-ammoniac, common salt, alum, Epsom salts, &c. &c., are all employed for this purpo

11. *Spermaceti.*—In some of the larger Cetacea, particularly in the white whale of the South Seas, there are peculiar cavities in the bones of the skull filled with a kind of blubber; and this oily fluid, when left to stand, begins to deposit small crystalline laminæ — *spermaceti* — in large quantities. The name is derived from an erroneous opinion that this substance is the spawn of the whale tribe.

The crude oil is placed in a cistern, below which a number of bag-filters are arranged, the upper parts of the bags being connected by a pipe with the oil cistern. The pressure of the oil forces the fluid sperm oil through the filter, and the solid fat remains. This operation is called *Bagging.* The bagged sperm is placed in cloths and submitted to heavy pressure, which removes the greater portion of the oil. The pressed sperm is melted, allowed to crystallise, and the crystals again placed in the press, which is now worked with a force of several hundred tons. The cakes are melted again, and boiled with a strong solution of caustic potash or soda, which saponifies any adhering oil without acting upon the spermaceti. The melted fat is crystallised in tin moulds, and once more submitted to the usual hot pressure, again boiled with the alkaline ley, and at last solidified in blocks for sale.

The substance is a very complex body, and we add the following table more by way of illustrating at sight the character of these compounds, than for any interest it possesses for the general reader:—

Stearate of oxide of stetyle	$C_{36} H_{35} O_3$	+	$C_{36} H_{37} O$
Palmitate of oxide of stetyle	$C_{32} H_{31} O_3$	+	$C_{36} H_{37} O$
Myristate of oxide of stetyle	$C_{28} H_{27} O_3$	+	$C_{36} H_{37} O$
Laurostearate of oxide of stetyle ..	$C_{24} H_{23} O_3$	+	$C_{36} H_{37} O$
Stearate of oxide of cetyle	$C_{36} H_{35} O_3$	+	$C_{32} H_{33} O$
Palmitate of oxide of cetyle	$C_{32} H_{31} O_3$	+	$C_{32} H_{33} O$
Myristate of oxide of cetyle	$C_{28} H_{27} O_3$	+	$C_{32} H_{33} O$
Laurostearate of oxide of cetyle ..	$C_{24} H_{23} O_3$	+	$C_{32} H_{33} O$

12. *Bees'-wax* is the substance which constitutes the cells of the bee-hive, and is secreted by an organ situated in the abdomen of the bee. The farina serves as food for the larvæ of the insect, while the wax is produced from the honey, for which it ultimately serves as a receptacle. The wax oozes out through the sacs where it is secreted, and is worked by the insect with its mandibles and proboscis, first into the form of a riband, which, being softened with a frothy kind of liquid, making it white and ductile, is ultimately formed into cells.

The *honeycomb* having been secured, the *virgin-honey* is allowed to flow out, and the remainder is removed by pressure. When the pressed comb is melted in boiling-water and allowed to cool, the *wax discs* are obtained which are met with in commerce. The crude wax from the comb is repeatedly melted, and passed through hair bags into cold water. It is finally melted and poured into conical moulds.

The destruction of the foreign matters in wax is effected by the aid of bleaching agents. It is first melted with diluted sulphuric acid, which renders it darker coloured, but very clear and translucent. It is again melted with a dilute solution of bleaching-powder, when a thick soapy mass is produced, from which weak muriatic acid separates the wax as a colourless fluid, which comes to the surface and solidifies to a perfectly white disc. The wax bleached in this way is said not to retain its whiteness, and that bleached by the sun's rays is preferred by the wax-chandlers.

Pure wax is a compound of two fatty bodies, one soluble in alcohol, called *Cerotic Acid* ($C_{54}\ H_{54}\ O_4$), and another insoluble in alcohol called *Myricine*, which contains palmitic acid in combination with a substance called Oxide of Mellissyl. Brodie has succeeded in making two new solid hydrocarbons from these bodies very similar to paraffine.

13. *Chinese, Japan, or Insect-wax,* has entirely superseded the use of bees'-wax in China, being the produce of the white-wax insect, which is supposed to feed upon an evergreen shrub, the *Ligustrum lucidum.* Much attention is paid to the cultivation of this plant, and it forms in China an important branch of agricultural industry. It is stocked with the insect three or four years after planting. The nests swell in a few days after being tied to the branches; and innumerable white insects emerge and spread themselves over the plant, but soon descend to the ground, where, finding no congenial resting-place, they reascend and fix themselves to the lower surfaces of the leaves. After some days they repair to the branches, and perforate the bark, to feed on the fluid within. Early in June the trees present the appearance of being covered with hoar-frost, being, as the natives say, "changed into wax." Soon after the wax is sprinkled with water, scraped from the trees, and spread on a strainer, covering a cylindrical vessel, which is placed in a caldron of boiling-water. When congealed it is ready for market, and is perfectly white, translucent, shining, with a crystalline surface, like spermaceti, and not unctuous to the touch. It is composed of *Cerotic Acid,* combined with *Oxide of Ceryle.* The annual value of the produce of this small creature is said to be 1,000,000 Spanish dollars.

T. R.

(*To be continued.*)

THE SHIPWRECK OF ST. PAUL.

CANTO II.

WHERE the northward sweeping sea
  Presses close with swelling breast
On the shrinking shores of Crete,
  Drawing back from the south-west,
  There the Paximades[*] rest:
There those islands lie like emeralds
  Set within a shield of gold;
Or, rather, zoned with greenest kirtles,
  As the Naïads were of old,
  Within the ripples cold
They bathe their silver feet,
  Silver feet of silvery sand,
And watch their own smiles in the water:
  Thus the Paximades stand;
  And above, a flowery band
Binds their foreheads, white with sunshine,
  Whence the trailers floating go
To rest upon their gleaming shoulders,
  And melt into the hazy woods below.

A bright speck twinkled in the east
  Upon the dim sea-line;
Slowly it steadied and increased
  Till white wings 'gan to shine.
As silent as a dream that glides
  Into the world of sleep,
It rose upon the shining sides
  Of the huge rounded deep.

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[*] Letoa, the principal island of this group, is the only one marked in ordinary maps, lying in the bay formed by the south-western coast of Candia.

Now nearer yet begin to show,
The bright above, the dark below,
The sails that glitter in the sun,
The leeward hull in shadow dun;
With measured movement, swinging deep,
A hundred oars the waters sweep;—
All at a stroke, with sullen dash
They plunge into the main;
All at a stroke they rise
Fringed with cascades of diamonds,—flash
Against the curving skies,
And fall and rise again.
Nor yet the favouring south wind fails,
But hotly breathes upon the sails,
As panting up from Libyan sands,
It wings its way to cooler strands.

What anguished thoughts are casting now
Their shadows over Julius' brow?
The breeze blows fair,—in one short hour
The doubt, the risk, the peril o'er,
Safe in Phenice's vaunted sound
Their anchors clip good holding-ground.
But what are winds, or fair or foul,
In that stern crisis of the soul,
When faith and life—despair and death,
Seem hung upon a moment's breath?
When that great problem, "What is truth?"
Vast with a thousand ages' growth,
Blocks up all life, chokes earth and heaven,
Until the talisman be given,
And the enormous doubt must shrink,
Condensed to form, and either sink

Blinded and grovelling to the sod,
Or mount on faith's swift wings to God.
His latest, strongest trust of all,
Hangs trembling on the truth of Paul;
And if that boding prophecy
Of "hurt and damage" prove a lie,
Then helpless on life's stormy main
His shattered soul must toss again.
And thus before the south wind fair
He drifts to ruin and despair:
Thus the broad-smiling, sunny sea
But mocks his last extremity;
And if the ship sweep safely round
Within Phenice's vaunted sound,
Then, wrecked upon a fatal coast,
His dearest venture will be lost.

'Tis hard for us, whose earliest youth
Has basked in the full light of Truth,
That from the zenith pouring free
Lights friend and foe impartially,—
'Tis hard to picture how, with eyes
Of eager, earnest, strained surprise,
Souls that desire of Truth had stirred,
Sick with the pangs of hope deferred,
Sad-wandering in the uncertain gloom
That shrouded ancient Greece and Rome,
Watched the first tints of morning rise
Slow reddening in the eastern skies,
And saw the sanguine glory swim
Above the horizon's distant brim.

Since the ship left the Syrian shores,
The vacant, slowly-floating hours

Saw the Centurion often stand
Conversing with the prisoner-band.
He heard them give in words of flame
His soul's unuttered wants a name,
And when the mighty Sacrifice
Stood forth to his adoring eyes,
Spontaneous faith, and love, and joy,
Told him it could not be a lie.
The vaguely-fluttering desire,
  That, often loosed before in vain,
Flew from his soul on wings of fire,
  And, disappointed, turned again,
Now scents at last the solid shore,
And speeds forth to return no more.

As one that searched, all dreamy-eyed,
For his unknown, dear, destined bride,
Fancied her found in each fair maid,
Again and yet again betrayed:
So, blindly seeking, Julius strove
To find the bride his Soul could love.
The common Faith came swimming by,
With fair, fresh face, sweet to the eye;
But as he turned to gaze and follow,
A skeleton obscene and hollow
Was all he saw,—and in its train
Gods cruel and impure as men.
As his indignant soul withdrew,
A nobler vision met his view:
One that, with chaste ethereal mien
    And disregardful eyes,
Sat throned in thought, the musing queen
    Of pure philosophies,
  Conversing with the silent skies.

His longing soul with reverence shook,
And as he marked her absent look,
Unconscious of the love he bore,
He worshipped and he loved the more.
His soul, drunk with her beauty, cried,
"Thou art my long-sought, destined bride!"
But yet she stirred not at his call,
Nor let her lifted eyelids fall:
He sprang to clasp her as his own,
But at his touch the glorious One was gone,
Dissolved in air, and he was left alone.

And many years went slowly by,
And his tired soul dragged heavily:
Earth's glowing joys came one by one,
  Its griefs their shadow made;
There seemed no purpose in the sun,
  No meaning in the shade,
Sowing till eve from morning prime
Without a hope of harvest time.
But souls that long for heavenly bread
Sooner or later shall be fed,
And all who worship Truth concealed
Shall one day worship Truth revealed.
So, worn with waiting, sad and tired,
He found her whom his soul desired:
Her clear credentials met his eye
Bright with historic certainty,
But deeper sunk within his heart
A dearer proof than these impart,—
That pure and warm response, till then
Though often sought, yet sought in vain.

But with flush of shame-faced fear
Fancy l ncil here:

Her palettes, bright with mortal hues,
To yield immortal tints refuse:
And those who know Truth's glorious face,
Need not an artist's hand to trace
Her beauty, as she rose in light
On Julius's adoring sight;
And for the rest,—a seraph's strain
Of rapt eulogium were in vain.

When the starved wretch at length is fed—
Doubts he the virtue of his bread?—
When the poor thrall is set at large,
Say, does he question his discharge?
And when returning exiles come
And fall upon the breast of home,
While sobs of joy are bursting round,
Oh, do they doubt that home is found?

So when the glad Evangel came
And snapped his bonds with words of flame;
When all his longing soul was fed
And satisfied with heavenly bread;
When, weary leagues of exile passed,
He gained his spirit's home at last,
And there at length found by his side
Truth, his long-sought-for, destined bride,—
Oh, when at length her calm sweet look
Like moonlight o'er his darkness broke,
Then love's deep ocean swelled and shone,
And circled round her rising throne.

So for a while the conquering Light
Drove back the flying shades of night;
But soon an ambushed cloud arising

While starry watchers slept,
Between their bright ranks crept,
The silver citadel of heaven surprising,
And the clear edges of her crystal wall
Sank indistinct beneath the sombre pall.

For with that first fond jealousy
That cannot brook suspicion's eye,
He feared to trust the Truth he loved, —
So long concealed, so lately proved, —
He feared to trust her forth at large
Within her own all-powerful charge,
And so built barriers to shut out
The contact of a single doubt.
When, in Fair Haven's Bay, he heard,
As from Her lips, Paul's boding word;
Within his inmost soul he knew
The Heaven-sent warning must be true.
But if, obedient, he should stay,
And winter in Fair Haven's Bay,
And all went well, — yet still perforce
The danger of the other course
Were left unproved to all the crew,
Whose scornful disbelief he knew.
And then his loathing fancy drew
The lifted brows, the curling sneer,
With which his guards the order hear.
So, self-deceived, his faith sank down, —
Fearing to trust the Strong alone,
Striving, in fond and foolish ruth,
To shield invulnerable Truth, —
His own unguarded heart became
A prey to doubts he dared not name.
Thus, ever, when the blade of Faith
Is left concealed within the sheath,

Not only is the mightiest sword
Missed from the battle of the Lord,
But with foul rust and dull decay
It slowly eats itself away.

Such anguished thoughts are casting now
Their shadows over Julius's brow:
He stands beside the plunging prow,
And his keen eyes scan eagerly
The aspect of the northern sky;
But the lips' sharper outlines show
Chiselled by strange contempt and woe,
As if the muscles hardened there
To battle with a last despair.

F. A. P.

THE PSALMIST.

FROM THE GERMAN.

The royal psalm-singer had just sung to his Deliverer one of his beautifullest hymns, and still the holy breath was stirring in his harp-strings as Satan stood up to tempt him — to incline his heart to pride on account of his goodly songs. "Hast Thou, O Almighty," he said, "among all Thy creatures one who can praise Thee more sweetly than I?"

Then in through the open window, before which he had spread forth his hands, there flew a tiny grasshopper and settled on the hem of his robe, and began to raise its clear, shrill morning-song. A multitude of grasshoppers assembled forthwith around. The nightingale came flying to join them, and in a little while all the nightingales were concerting with one another in the praise of the Creator.

And the ear of the king was opened, and he understood the song of the birds, the voice of the grasshoppers, and of all living, the murmur of the brooks, the rustling of the groves, the music of the morning-star, the ravishing strain of the rising sun.

Lost in the high harmony of the voices which, unceasing and unwearied, praise the Creator, he was silent, and found that, with all his lofty minstrelsy, he must stand behind the grasshopper, which sat chirping on the hem of his garment. Humbly he seized his harp and sang, "Bless the Lord, all ye his works in all places of his dominions: bless the Lord, O my soul!"

REVIEW OF THE MONTH.

The promises of our London publishers for the forthcoming season are not particularly exciting. In the meanwhile a few works of solid value are from time to time making their appearance, and, which is hardly less important, new editions re-written or re-modelled of standard books. The Rev. H. Alford has issued a third volume of his "Notes on the Greek Testament," and Professor Edward Robinson has published an additional volume of "Biblical Researches in the Holy Land." We have a revised and extended reprint of Prichard's "Natural History of Man;" and in four huge volumes, aided by Dr. Tregelles and Professor Davidson, the venerable Hartwell Horne has brought out an entirely new edition of that great storehouse, his "Introduction to the Critical Study of the Holy Scriptures."

There are few subjects on which we more desiderate a sound and sober theology, and on which we should be more grateful for a lively personal consciousness, than that in-dwelling and in-working of God's Spirit which form so conspicuous a promise to the New-Testament Church, and which were so largely enjoyed in the primitive time. We were therefore prepared to give a special welcome to two little volumes which have lately come in our way: the one anonymous, "The Comforter; or, Joy in the Holy Ghost: A Word for the Restless;" the other by the Rev. W. Arthur, "The Tongue of Fire; or, the True Power of Christianity." The former we do not like the less because it raises some questions which we are not prepared at once to answer in the way which the author indicates. It is the work of a deep and independent thinker, and contains much that is true and beautiful. Mr. Arthur's book conveys in glowing language a large fund of Scriptural truth and profound philosophy. Thoughtful men will find it an instructive treatise, and from the intense earnestness with which it is written, we trust that it is destined to quicken the piety of many private Christians and to kindle afresh the fervour of many preachers.

Mr. Gosse has published the second and concluding part of his "Manual of Marine Zoology for the British Isles,"—a little work which will answer every purpose of the collector who cannot afford many and costly books; and which contains not only a description, but a drawing of almost every creature which the explorer of our coasts is likely to find. The Society for Promoting Christian Knowledge is making very spirited efforts to supply the public with entertaining introductions to science. Two of these are now before us,—"Wanderings through the Conservatories at Kew," and "Light: Its Nature and Applications." This last contains a clear and excellent account of photographic processes, and both volumes are illustrated in a superior style of art, and are admirably adapted for village libraries. "Marion Falconer; or, Stars in the Darkness," by E. H. W., is a tale of much depth and genuineness,—lively and pathetic by turns, and far better written than tales of good intention usually are.

Our attention has been recalled to a volume of poems by Mr. A. Carlile, which we ought to have noticed a year ago. It is a work of real merit. In an age of more leisure a didactic poem like "The Deity in Man" would have made its author famous. But whatever may be the amount of their popularity, the author must have already found a rich reward in his own noble sentiments and beautiful imaginings.

It is seldom that the musical world appeals to our critical judgment, perhaps because we are not easily pleased. We are, therefore, all the happier in being able to give our hearty and unhesitating verdict in favour of Mr. Wrighton's Songs. Nothing can well exceed the popularity of "The Postman's Knock;" but it is in compositions of a different strain in which he has chiefly appeared of late, and we know few effusions which in tenderness and melody surpass "Like a Flower," or "As one by one our friends depart." It is enough to say, that "Smiles and Tears," "On the Banks of a beautiful River," "Her sweet Smile haunts me still," are rich in that music, which does not merely play upon the ear, but which penetrates the heart and sets the better thoughts a-going.

The Mosque of Omar, Jerusalem.

THE MOSQUE OF OMAR.

The land of Moriah witnessed the most wonderful act of faith which human nature has ever been enabled to exhibit. There Abraham, at the command of God, showed himself willing to offer up a son whom he not only loved with fondest affection, but whose preservation he had learned to regard as essential to the welfare of the world. Such was his confidence in the faithfulness and power of the Most High that, rather than allow the promise to be falsified, "In Isaac shall all nations be blessed," he believed that God would restore his son from the ashes of the altar.

Abraham was the Father of the Faithful, and this was the crowning act of Abraham's faith. But solemn as was the spot where that altar was built, and where that unprecedented victim was bound, and sacred as were the recollections of the Angel-Jehovah's appearance,—"By myself have I sworn, saith the Lord, because thou hast done this thing, and hast not withheld thy son, thine only son; that in blessing I will bless thee, and in multiplying I will multiply thy seed as the stars of the heavens, and in thy seed shall all the nations of the earth be blessed,"—ages appear to have elapsed before any special sanctity was attached to the locality. When at last the stronghold of Zion became the capital of the Holy Land, it would seem that the hill of Moriah was a farm still occupied by a Canaanite family, and as the best place for catching any passing breeze, they used as a threshing-floor the summit, or one of the rocky projections, of the mountain, which became well known as "the threshing-floor of Araunah the Jebusite." On that mournful occasion when David had committed a trespass in numbering the people, and when seventy thousand of the inhabitants perished as a rebuke to the ambitious projects of their ruler, it was at the threshing-floor of Araunah that the destroying angel staid his hand and the pestilence ceased. Consequently, and in obedience to a divine command, on this spot David erected an altar, and on it presented burnt-offerings and peace-offerings. There is every reason to suppose that the altar stood throughout the remaining days of King David, and it is not wonderful that with its twofold association, as the scene of Isaac's virtual sacrifice and the spot where the pestilence was so mercifully arrested, David should have selected the locality as the site of his projected Temple. That Temple David was not permitted to rear; but at the outset of the reign of his successor we read, "Then Solomon began to build the House of the Lord at Jerusalem in Mount Moriah, where the Lord appeared unto David his father, in the place that David had prepared in the threshing-floor of Ornan (or Araunah) the Jebusite." *

As the rocky surface of Moriah slopes rapidly towards the south, much labour must have been expended in leveling it, so as to secure an area extensive enough for the magnificent house builded by Solomon. Nor only this; but there is every reason to believe that even as early as this first Temple were those substructions commenced which encroached on the valley of Kedron, and which not only extended the consecrated limits, but added exceedingly to the grandeur and impressiveness of the entire elevation as viewed from without.

Solomon's Temple, after standing four centuries, was burned down by Nebuchadnezzar, and seventy years afterwards a second but less sumptuous shrine was erected in the same locality by Nehemiah. This second structure stood for five hundred years and upwards, when, by a process of gradual reconstruction, it was replaced by Herod the Great;

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* 2 Chron. iii. 1, compared with 2 Samuel, xxiv. 15–25.

whose third and splendid temple was hardly completed when the torch of the frantic Jews and the crowbars of the conquering Romans laid it in ruins.

In the year 636, the Caliph Omar, the third in succession from Mahomet, took Jerusalem. On the site of the Temple he built a small but elegant mosque,—an octagon, each side of which measures sixty-seven feet, and which is still known by his name. He also enclosed the area which, we may assume, constituted the precincts of the original Temple, probably adding a dome to a Christian church which he already found there, and which is now known as the little mosque of El Aksa.

At the end of the eleventh century the Crusaders took Jerusalem. Great numbers of the Moslems sought refuge in the hallowed precincts, but found there no asylum. Ten thousand were put to the sword, and the same slopes which had once been heaped with slaughtered Jews now flowed down with the blood of Saracens.

The turn of the Christians came next. Godfrey, the first Christian king of Jerusalem, converted into a church the Mosque of Omar, and for nearly a hundred years a golden cross glittered on the summit of the handsome dome. But, under the irresistible Saladin, the Moslem once more recovered possession. The golden cross was hurled from its elevation, and contemptuously dragged through the streets; and, when floods of rose-water had washed out the taint of Nazarene footsteps, the floor swarmed, as of old, with the followers of the false Prophet.

Ages on ages have elapsed, during which no Frank has been allowed to penetrate the awful shrine. The attempt would have been certain destruction; and it is said that more than one life has paid the forfeit of its hardihood.

However, in the year 1818, Dr. Robert Richardson, in consequence of professional services rendered to the Governor of Jerusalem, was allowed to pay no fewer than four visits to the holy place, and of his minute explorations he soon afterwards published an interesting account. His precedent was followed in 1833 by Messrs. Bonomi and Catherwood,—the former of whom was indebted for his safety to his command of the Arabic language, whilst the latter, for six weeks together, enjoyed free ingress and egress from an impression which had gone abroad that he was an "effendi" sent by the Pasha of Egypt to make drawings with a view to a general repair of the building. Within the last two years, however, owing to the desire of the Turkish authorities to oblige the French and the British, as well as through the gradual softening-down of Moslem fanaticism, the gates of the sanctuary have opened to many visitors, and the interior may be regarded as one of the established sights of Jerusalem; and no doubt we shall learn many interesting particulars from the forthcoming works of Dr. Bonar and other travellers.

Under the dome of Omar's Mosque is a remarkable limestone rock. "With its irregular form," as Mr. Catherwood states, "it occupies the greater part of the area beneath, and is surrounded by a gilt iron railing, to keep it from the touch of the numerous pilgrims. It appears to be the natural surface of the rock of Mount Moriah: in a few places there are marks of chiselling. Over this hangs a time-worn crimson silk canopy. At the south-east corner of this rock is an excavated chamber, called by Mahomedans the Noble Cave, to which there is a descent by a flight of stone steps. This chamber is irregular in form, and its superficial area is about 600 feet, the average height seven feet. In the centre of the rocky pavement is a circular slab of marble, which, being struck, returns a hollow sound, clearly showing that there is a well or excavation beneath." The general opinion is that this rock,—known among the inhabitants of modern Jerusalem as "Kubbet es Sukrah," and by Mahomedans held in veneration only second to the famous Caaba at Mecca,—is the identical threshing-floor of Araunah, and the spot on which David erected his altar, and over which it is not improbable that the Holy of Holies afterwards stood. The Jews have an impression that the Ark of the Covenant is still concealed somewhere under the floor of this Mosque; and although no one who recalls the Arch of Trajan will attach much importance to this notion of theirs, it is by no means unlikely that were the "Bir arruah," or "Well of Souls," examined, it would be found to contain objects of deep interest. To say nothing of vessels, &c., which may have accidentally fallen into it, and which a deep draw-well was not likely to restore, it seems only natural to suppose that in the case of a sudden surprise the priests may have intrusted to its guardianship spoils which they were reluctant should fall into the hands of the enemy.

The Mosque of Omar, with its double dome and its various-coloured marbles, is a building of great beauty. As described by the visitor, its corridors within are "airy, light, and elegant, and the sun, streaming through the richly-stained glass windows, casts a thousand varied dyes upon the highly-decorated walls and marble pavement. In striking contrast to this is the solemn and impressive appearance of the dome: the eye in vain strives to pierce its gloom, to unravel its maze of rich arabesque ornaments, and read its lengthened inscriptions drawn from the Koran. In perfect keeping are the groups of pilgrims and devout Mussulmans from all parts of the Mahomedan world, from India to Morocco. Their picturesque variety of dress and feature, their deeply devout deportment, as, headed by dervishes in green robes and high conical caps, they silently prostrate themselves in prayer, thankful to have attained the term of their weary pilgrimage, are very striking." J. H.

LIFE, IN ITS HIGHER FORMS.

No. V. (*continued*).

MAMMALIA.

It has been a question among zoologists whether or not Man ought to be considered as an animal, and to take his place in the System of Nature with a generic and specific name. Some have decided in the affirmative, as Linnæus, who places *Homo sapiens* at the head of his *Primates*, and Cuvier, who creates an order, "*Bimanes*," for the express reception of the human species. Others, as Aristotle, Ray, and Swainson, exclude him from their systems, and refuse to assign him a zoological place. The grounds of this exclusion are tersely expressed by the present Archbishop of Canterbury, in the following words: "There is nothing philosophical in the comparison of a being possessed of improveable reason with one that is governed by natural instinct, because there is no just affinity between the talents which are compared."*

We incline to think, however, that both these hypotheses are true. Man, in regard to his body and soul, is an animal, and is to be compared with other animals;—he is the highest form in the highest Class; while it is in regard to his spirit, the moral consciousness of responsibility, the principle which constitutes him capable of worshipping God, that he is separated from the brute creation, and placed *per se*. The contrast between Man and Beast is not a *contrast between reason and instinct*, common, and almost universal as is this supposition, for it can be readily shown that these two mental qualities, though very different, are by no means inseparable; that in point of fact the Dog is endowed with reason as well as instinct, and that Man performs many actions which are purely instinctive, as well as those which are prompted by reason. We shall presently adduce some examples in proof of the former of these propositions.

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* "Records of Creation," i. 13.

What is the nature of Spirit, or How that principle can be defined, by the possession of which Man is raised above companionship with the Ape and the Dog, is a question which we will not attempt to answer. "In the image of God made He man." The Creator, who spoke all other terrestrial existences into being by His almighty Word, condescended to "breathe into the nostrils" of Man, whom He had formed out of dust, "the breath (or spirit) of life." Thus his spiritual part was a direct emanation from the Deity, who had respect to the wondrous plan, devised before the foundation of the world, whereby the creature Man was to be brought into the closest union with Himself. Here is the true dignity of Man: it is not that he is a reasonable being; it is not that he is a moral being; but it is that by an act of stupendous grace his being has been shared by the everlasting God, who became partaker of his flesh and blood,* in order that he might become a partaker of the Divine nature.† Behold! what manner of love the Father hath bestowed upon us, that we should be called the sons of God!

To some it may appear strange that we should consider the possession of *a soul*, as well as a body, common to the Brutes with Man, and may possibly startle even some who do not fall into the general mistake of confounding the soul with the spirit. Yet it is evident that the inferior creatures do manifest mental attributes. "The phenomena," observes Dr. Prichard, "of feeling, of desire and aversion, of love and hatred, of fear and revenge, and the perception of external relations, manifest in the life of brutes, imply, not only through the analogy which they display to the human faculties, but likewise from all that we can learn or conjecture of their particular nature, the superadded principle, distinct from the mere mechanism of material bodies. That such a principle must exist in all beings capable of sensation, or of anything analogous to human passions and feelings, will hardly be denied by those who perceive the force of arguments which metaphysically demonstrate the immaterial nature of the mind."[*]

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* Heb. ii. 14.

† 2 Pet. i. 4.

Instinct has been defined[†] as a natural impulse to certain actions which animals perform without deliberation, and without having any end in view, and without knowing why they do them. It differs from intellect in the unerring certainty of the means it employs, the uniformity of its results, and the perfection of its works prior to, and independent of, all instruction or experience; and lastly, by the pursuit of nothing beyond what conduces directly either to the continuation of the individual or the propagation of the kind. But the arts of rational creatures proceed slowly through diversified and oft-repeated experiments, while the means they employ are always various, and seldom the best and most appropriate.[‡]

Assuming the correctness of this diagnosis, let us examine the source of the actions recorded in the following anecdotes :—

"The battering-train going to the siege of Seringapatam, had to cross the sandy bed of a river that resembled other rivers of the Peninsula, which leave, during the dry season, but a small stream of water running through them, though their beds are mostly of considerable breadth, very heavy for draught, and abounding in quicksands. It happened that an artilleryman, who was seated on the tumbril of one of the guns, by some accident fell off, in such a situation that in a second or two the hind-wheel must have gone over him. The Elephant, which was stationed behind the gun, perceiving the predicament in which the man was, instantly, without any warning from its keepers, lifted up the wheel with its trunk, and kept it suspended till the carriage had passed clear of him."*

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[*] "Nat. Hist. of Man."

[†] Beattie, "Mor. Sci." I. ii. § 8.

[‡] "Penny Cyclop." xii. 497.

"While an old man was wandering by the side of one of the largest tributaries of the Almand, he observed a Badger moving leisurely along the ledge of a rock on the opposite bank. In a little time a Fox came up, and after walking for some distance close in the rear of the poor Badger, he leaped into the water. Immediately afterwards came a pack of hounds at full speed in pursuit of the Fox, who by this time was far enough off floating down the stream, but the luckless Badger was instantly torn to pieces by the dogs."†

"A gentleman was engaged in the amusement of coursing, when a Hare, closely pressed, passed under a gate, while the dogs followed, by leaping over it. The delay caused to her pursuers by this manœuvre seems to have taught a sudden and useful lesson to the persecuted creature, for as soon as the dogs had cleared the gate and overtaken her, she doubled and returned under the gate as before, the dogs again following and passing over it. And this flirtation continued backwards and forwards until the dogs were fairly tired of the amusement, when the Hare, taking advantage of their fatigue, quietly stole away."‡

Of Dogs numberless well-authenticated stories are on record (and almost every one can add to the number from his own circle of information or observation), which indicate a comparatively high degree of reasoning power. Who has not observed the intelligence of those Dogs which lead the blind through crowded thoroughfares and dangerous places, always awake, not to their own comfort, but to the safety of their unconscious masters? Montaigne has seen one of these Dogs along the ramparts of a town leave a smooth and uniform path, and take a worse, in order to lead his master from a too close proximity to the edge.

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* "Twelve Years' Military Adventure."

† "Zoologist," ii.

‡ Loudon's Mag. N. H., iv.

M. Fred. Cuvier, in his highly interesting description of an Orang, brought to France by M. Decaen, makes the following statement. After alluding to its love for its owner, he says: "This principle of affection generally induced our Orang to seek the society of those persons with whom it was acquainted, and to shun solitude, which was at all times displeasing to it. On one occasion it exhibited for this purpose a very remarkable degree of intelligence. It was kept in a small room off a large saloon, usually occupied by the members of the family, and had frequently been observed to mount a chair which stood contiguous, for the purpose of unbolting the door and joining the rest of the company. At length the chair was removed to a distant corner of the room for the express purpose of preventing the intrusion; but scarcely had the door been shut than it was again opened, and the Orang was seen in the act of descending from the identical chair, which he had carried back again to its old situation, to enable him to mount up to the height of the bolt. It is certain that the animal had never been taught to act in this manner, nor had he ever seen others do so; the whole affair was the result of his own natural reason, and differed in no respect from what a human being would have done in like circumstances."

And is not this a legitimate deduction? and will it not apply to all the examples we have enumerated, and to thousands of others? The Elephant had never been *taught* to lift wheels when they threatened to crush fallen men; nor the Fox to transfer his own peril to a stray Badger; nor the Hare to run to and fro under a gate; nor the blind man's Dog to give a wide berth to the rampart's verge. The actions were not the results of education, of habits induced by training. Neither were they, or any of them, marked by "unerring certainty in the means," or "uniformity in the results," nor can it be said that they were "performed independently of all experience:" they differed *in toto* from instinctive actions. Every one of them indicates a reasoning power, combining cause with effect, using the light of past experience, or perceiving the suitability of some resource to present emergency, and that, in one or two of the cases, as in those of the Fox and the Hare, with a sudden promptitude which in man would have been admired as presence of mind. Why should we hesitate to call it so here?

Instances are not wanting in which the inferior animals have manifested a capacity for comprehending some of the more abstract notions, such as time, number, and language,—notions which certainly have little in common with *instinct.* Southey, in "Omniana," mentions two Dogs which were able to count the days of the week. One of these, he says, belonged to his grandfather, and was in the habit of trudging two miles every Saturday to cater for himself in the shambles. "I know," he adds, "a more extraordinary and well-authenticated example. A Dog, which had belonged to an Irishman, and was sold by him in England, would never touch a morsel of food *upon Friday.*"

"The Oxen that served in the royal gardens of Susa, to water them, and turn certain great wheels to draw water for that purpose, to which buckets were fastened (such as there are many in Languedoc), being ordered every one to draw a hundred turns a-day, they were so accustomed to this number, that it was impossible by any force to make them draw one turn more; but, their task being performed, they would suddenly stop, and stand still."*

As proofs that Brutes can acquire some knowledge of human language, we may mention the following facts and anecdotes out of many. Mr. W. C. Martin says:—"We have two Dogs, a spaniel and a terrier, both of small size; and if, by way of trial, in the course of conversation we say, in the ordinary tone of voice and without looking at them, 'I am sure there must be a cat somewhere about the house,' they are instantly excited, and search in every place for the animal, to which they bear instinctive hatred."† Dr. Gall says that Dogs learn to understand not merely separate words or articulate sounds, but whole sentences expressing many ideas. In his treatise "Sur les Fonctions du Cerveau," is the following passage: "I have often spoken intentionally of objects which might interest my Dog, taking care not to mention his name, or make any intonation or gesture which might awaken his attention. He, however, showed no less pleasure or sorrow, as it might be, and, indeed, manifested by his behaviour that he had perfectly understood the conversation which concerned him. I had taken a bitch from Vienna to Paris; in a very short time she comprehended French as well as German, of which I satisfied myself by repeating before her whole sentences in both languages."

Elephants habitually perform certain duties on the mere verbal promise of special rewards, which it would be very dangerous to withhold when the condition is accomplished.

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* Montaigne's "Essays," ii. 12.

† "Hist. of the Dog," 99.

But one of the most remarkable examples on record of this faculty, is the following story of a Spaniel, avouched by the personal knowledge of a zoologist of deserved reputation. "One morning, as the lady to whom the spaniel belongs was lacing her boots, one of the laces broke. She turned to the dog, and playfully said, 'Oh dear! I wish you would find me another boot-lace;' and having managed with the broken one, thought no more about it. On the following morning, when she was again lacing her boots, her spaniel ran up to her with a new silken boot-lace in his mouth; not only to her great amazement, but that of the family. Where the dog had obtained the boot-lace no one could tell; but, doubtless, he had purloined it from some workbox or similar repository."*

The same naturalist has mentioned several instances in which a communication was made by one animal to another of certain events that had occurred to the former, and of a definite and intelligent common action resulting.

Every observant reader must be aware that the Brutes—especially those which, being domesticated, come more frequently under our notice—display many of what, in ourselves, we call *moral* feelings or affections, whether good or bad; but, perhaps, all are not cognisant of the extent of the category. We could readily cite anecdotes to prove that love, hatred, jealousy, gratitude, pity, sympathy, faithfulness, obedience, sorrow, joy, pride, revenge, and even conscience of guilt, are attributes of the bestial, no less than of the human soul. Some of these are too commonly witnessed to need illustration, but we shall cite a few examples.

The affection of the Dog for his human friend is so fervent, so tender, that it is scarcely surprising that it should sometimes beget that horrid accompaniment—jealousy, with which in our nobler bosoms it is so often associated. Nor is it only of their own species that Dogs are jealous; any intruder that appears to share the regard which they had been accustomed to consider exclusively their own, becomes an object of fierce hatred. M. Blaze mentions a Dog which died of consumption, because its mistress received home an infant that had been put out to nurse. He growled whenever he saw her kiss the child. In 1841, a bull-dog in Paris flew upon and killed a child of six years old, in the arms of his mother; the only reason for this ferocity being that the little fellow had been in the habit of caressing another Dog in the sight of the savage animal, which had always, before this, been kept chained.

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* Martin's "History of the Dog," 183.

As to pride, it is well known in the East that the Elephant receives pleasure from his gorgeous trappings, and moves with a more stately step, and with manifest appreciation of his honours, when bedizened in scarlet and gold. Pliny relates that one of the Elephants of Antiochus, having been deprived of his silver ornaments for refusing to sound the depth of a river, rejected his food, and actually died under the sense of his disgrace.

The same intelligent creature shall afford us an illustration of sympathy, so strong as to overcome even the obedience habitual to the animal. Bishop Heber saw an old half-starved Elephant fall under his work, and being unable to rise, another of very large size was brought to assist him. "I was much struck," says the good Prelate, "with the almost human expression of surprise, alarm, and perplexity in his countenance, when he approached his fallen companion. They fastened a chain round his neck and the body of the sick beast, and urged him in all ways, by encouragement and blows, to drag him up, even thrusting spears into his flanks. He pulled stoutly for a minute; but on the first groan his companion gave, he stopped short, and turned fiercely round with a loud roar, and with his trunk and fore-feet began to attempt to loosen the chain from his neck."

Dr. Abel, in his minute account of the manners of a Bornean Orang, speaks of the fits of passionate anger into which he would sometimes fall. "If repeatedly refused an orange, when he attempted to take it, he would shriek violently, and swing furiously about the ropes; then return and endeavour to obtain it: if again refused, he would roll for some time like an angry child upon the deck, uttering the most piercing screams, and then suddenly starting up, rush furiously over the side of the ship, and disappear. On first witnessing this act, we thought he had thrown himself into the sea; but on a search being made we found him concealed under the chains."

The worthy Doctor says that this act, in a rational being, would have been called the threatening of suicide. Was it anything else in this Ape? Was not the act evidently the result of a process of reasoning, founded on his observation of the value his master set on him, and comprehending the sorrow which the supposed loss would produce? The cautiousness which determined that it should be only a *deceptive* loss was a refinement of intellect, almost human; it reminds us of that inimitable line of Burns's—

"*Spak* o' loupin' owre a linn."

A kindred animal—the Siamang—shall afford us an example of a mental principle very like conscience. The Dog and Cat, however, often display its workings as well. In Mr. Bennet's "Wanderings," there is an account of this

Ape, which he was keeping. In the cabin, there was a piece of soap, which had excited the Siamang's cupidity, and for the abstraction of which he had been several times scolded. One day Mr. Bennet, while engaged in writing, happened to see the Siamang engaged in his thievish practices. "I watched him," says the observer, "without his perceiving that I did so; he occasionally cast a furtive glance towards the place where I sat. I pretended to write; he seeing me busily engaged, took up the soap and moved away with it in his paw. When he had walked half the length of the cabin, I spoke quietly, without frightening him. The instant he found I saw him, he walked back again, and deposited the soap nearly in the same place whence he had taken it; thus betraying, both by his first and last actions, a consciousness of having done wrong."

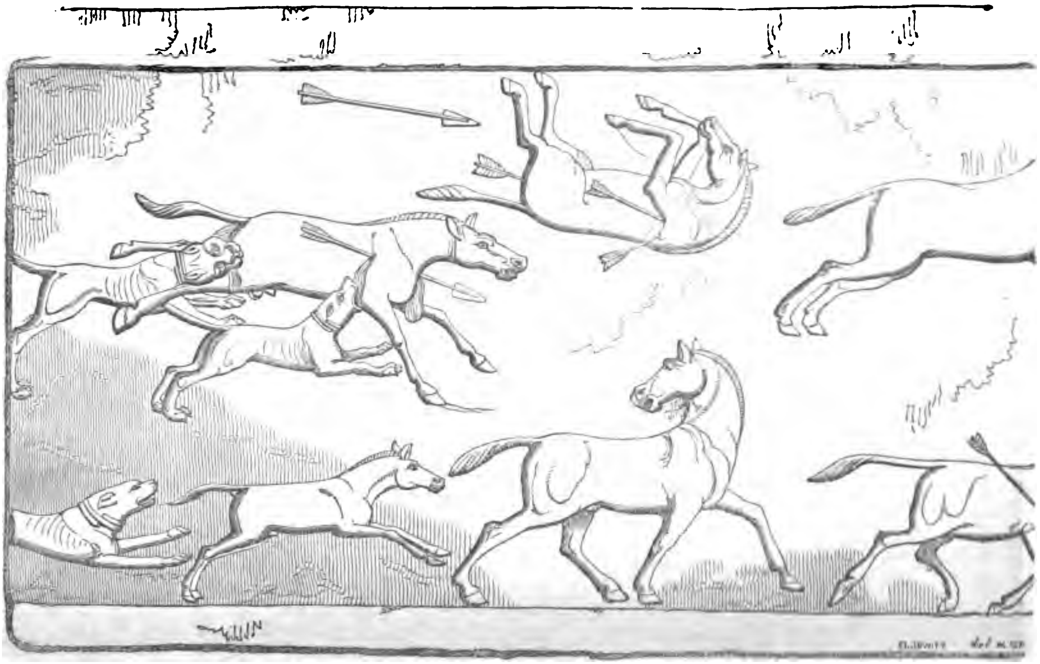
We shall close these anecdotes with a very touching one, illustrative at once of the most tender and faithful love, and of the deepest sorrow. After the Battle of Aughrim, the bodies of the Irish were left where they fell, to the birds of the air and the beasts of the field. Among them was an Irish officer, who was killed and stripped in the battle. But his faithful Dog discovered his remains, and guarded the body day and night; and though he fed with other dogs on the slain around, yet he would not allow them or anything else to touch the body of his master. When all the dead bodies were consumed, the other dogs departed; but this one used to go in the night to the adjacent villages for food, and presently return to the place where his master's bones only were then left. Thus he continued from July, when the battle was fought, till January following, when one of Colonel Foulk's soldiers, who was quartered in the neighbourhood, happening to go near the spot, the Dog, fearing he came to disturb his master's bones, rushed upon the man, who unslung his musket on the instant, and shot the poor animal dead. He expired faithful as he had lived.

Here we take a respectful leave of our readers. We have sought to lead them, rapidly but not unobservantly, through the wide range of animated being. Our course has been like that of a railway-passenger through a varied and fertile country: it is but a small portion of the expanse that falls under his brief and rapid glances, but then this affords him a fair sample of the whole. We have left untouched multitudes of details, not less interesting in themselves, nor less suggestive than those which we have noticed; but these may suffice to be the spokesmen of the vast band, who with one accord render unceasing praise—not less eloquent because silent to the ear of sense—unto Him who made them all for His own glory. Let us listen to and join in their song—the song of "every creature which is in heaven, and on the earth, and under the earth, and such as are in the sea, and all that are in them:"—

"BLESSING, AND HONOUR, AND GLORY, AND POWER, BE UNTO HIM THAT SITTETH UPON THE THRONE, AND UNTO THE LAMB, FOR EVER AND EVER!"

"THOU ART WORTHY, O LORD, TO RECEIVE GLORY, AND HONOUR, AND POWER; FOR THOU HAST CREATED ALL THINGS, AND FOR THY PLEASURE THEY ARE, AND WERE CREATED!"

P. H. G.



Pursuit of Wild Asses. (Nineveh Marbles.)

THE HORSE AND ASS.

Many are the useful servants given to man by a provident Creator. There is none more useful, few more noble than the Horse. The Arab and the Cossack in the old world find their chief treasure in the horse, while many of the Indian tribes, both of North and South America, may be said almost to live on horseback. The Gauchos, a half-civilised race, who gallop over the ocean-like Pampas of the Banda Oriental, are among the finest horsemen in the world. Mr. Darwin tells us of an assembled army of these people who elected their general by the following trial:—A troop of unbroken horses were driven into a corral and let out through a gateway, over which was a cross-bar. The soldiers agreed that whoever should drop from the bar on one of these wild horses as it rushed out, and should succeed in riding it without saddle or bridle, and then bring it back to the door of the corral, should be their general. The person who succeeded was accordingly elected. The same naturalist, in 1833, saw immense troops of mares swimming across the Rio Colorado, in order to follow a division of troops into the interior. Mare's flesh is the only food these Gaucho soldiers have when on an expedition; and unloaded horses travel there a hundred miles a-day for many days successively.*

The Indians of North America are also nearly as expert horsemen as their brethren in the South, and employ them much in the pursuit of the herds of buffaloes which scour the prairies of the West. Mr. Darwin refers to the chief Indians of the Pampas keeping one or two picked horses, ready for any urgent occasion; he tells us of a cacique who escaped from his pursuers on one of these animals. It was an old white horse with neither saddle nor bridle; on this he sprung, taking with him his little son. "To avoid the shots, the Indian rode in the peculiar method of his nation, namely, with an arm round the horse's neck, and one leg only on its back. Thus hanging on one side, he was seen patting the horse's head, and talking to him. The pursuers urged every effort in the chase; the commandant three times changed his horse, but all in vain. The old Indian father and his son escaped and were free. What a fine picture one can form in one's mind,—the naked bronze-like figure of the old man with his little boy, riding like a Mazeppa on the white horse, thus leaving far behind him the host of his pursuers!" Horses are not indigenous to America. They were introduced by the Spaniards; the myriads in La Plata, for instance, spring from seventy-two horses, which the first colonists landed with in 1535.

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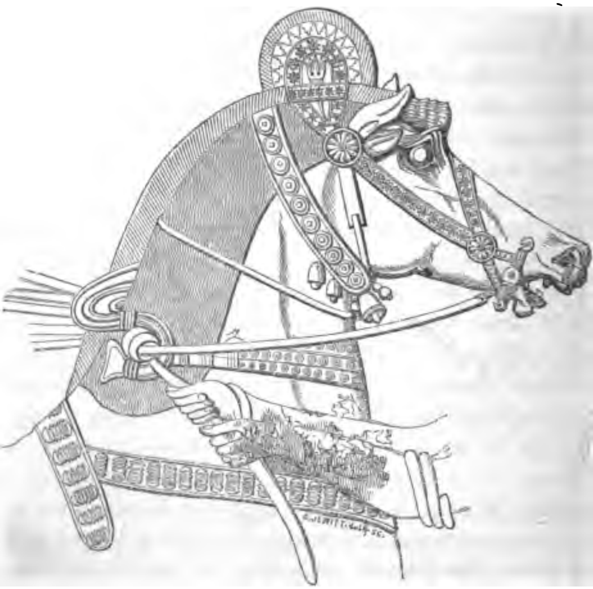
* "Researches in Geology and Natural History," pp. 83, 86.

But it is in the East that, as Col. Chesney says, the horse is found "in a state bordering on perfection." There he is distinguished by the smallness of his head, with its pointed ears, by the peculiarly clean muscular limbs, by the delicacy and slenderness of his shape, and by the animation of his large eyes, which have much of the intelligence so conspicuous in the dog. "He is frequently allowed to frolic through the camp like a dog, and at other times he is piqueted at the entrance of the tent; he is exposed to the weather at all times, and, compared with the treatment of his species in Europe, he is scantily fed. A meal after sunset, consisting of barley, in some parts of the country, and camel's milk in others, or a paste of dates and water, which, in Medjid, is mixed with dried clover and other herbs, constitutes his usual sustenance; but on any extraordinary exertion being required, flesh is frequently given, either raw or boiled."

Although the horse with us is much used in the cultivation of the ground and as a beast of burden, it was not so employed in Scriptural times, nor is it in the East at the present day. The noble description in the 39th chapter of Job shows that the horse was then employed chiefly in war. "Hast thou given the horse strength? hast thou clothed his neck with thunder? The glory of his nostrils is terrible. He paweth in the valley, and rejoiceth in his strength: he goeth on to meet the armed men. He mocketh at fear, and is not affrighted; neither turneth he back from the sword. The quiver rattleth against him, the glittering spear and the shield. He swalloweth the ground with fierceness and rage: neither believeth he that it is the sound of the trumpet. He saith among the trumpets, Ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting." (Job, xxxix. 19–25.) The Jews were commanded not to multiply horses, and woe is pronounced by the mouth of Isaiah on them, who "go down to Egypt for help, and stay on horses, and trust in chariots, because they are many, and in horsemen, because they are very strong; the Egyptians are men, and not God; and their horses flesh, and not spirit." (Isa. xxxi. 1, 3.) At that time the Jews had lapsed into idolatry, and under their kings carried on wars with the surrounding nations, and like them employed chariots and horsemen; for we read that "Solomon had forty thousand stalls of horses for his chariots, and twelve thousand horsemen" (1 Kings, iv. 26); whereas, in the days of Joshua, the Jews were commanded to hough the horses taken in battle from their enemies, and not to keep them (Joshua, xi. 6).

It was for war and for purposes of show that horses are mentioned in the Bible as being kept by the nations of the East, some of whom dedicated their finest horses to the sun, —an idolatrous practice, in which they were followed by the Jews before the time of good king Josiah, who destroyed idolatry in his dominions, as is recorded in the 23d chapter of 2 Kings: "He took away the horses that the kings of Judah had given to the sun, at the entering in of the house of the Lord, ... and burned the chariots of the sun with fire," (xxiii. 11.)

On the Assyrian monuments in the Museum, the trappings of the horse are given with such fulness of detail, that a large illustrated work might be published on this subject alone. Indeed, it is much to be wished that some literary saddler would take up the matter and furnish such a monograph. He would find interesting matter, too, in the costume of the charioteers, and the pedestrian attendants with their strong, rough, well-laced boots. The most minute ornament on the metal bindings and other appendages of the head-gear has been faithfully copied by the sculptor. In the accompanying woodcut, one of the most simple, but



at the same time one of the neatest specimens of horse-gear is represented. It is faithfully copied from one of the two horses attached to the car of Assur-bani-pal, and which are being stopped by the driver and his assistants, the king having turned round to address some one.

Habakkuk, who prophesied about the time when many of these marbles were sculptured, refers to the Chaldeans, "that bitter and hasty nation," who were so "terrible and dreadful" when they came "up for violence." "Their horses also are swifter than the leopards, and are more fierce than the evening wolves; and their horsemen shall spread themselves, and their horsemen shall come from far; they shall fly as the eagle that hasteth to eat." (Hab. i. 8.) Mr. Layard remarks, in his first work, that "the horses of the Assyrians were well formed, and apparently of noble blood." "No one can look at the horses of the early Assyrian sculptures without being convinced that they were drawn from the finest models. The head is small and well shaped, the nostrils large and high, the neck arched, the body long, and the legs slender and sinewy."* According to this author, the Egyptians would appear to have been chiefly indebted to the countries watered by the Tigris and Euphrates for their horses, as we know that these same plains furnished horses to the Persians, both for the private use of the king and for his troops; according to Herodotus, 16,800 of these animals were maintained by the Babylonians for the Persian monarch.

On his journey to Palmyra, Mr. Porter's† little caravan was surprised by a party of the Bedowin. One of these separated from his companions to take a view of the caravan.

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* "Nineveh and its Remains," vol. ii. 360.

† "Five Years in Damascus." By Rev. J. L. Porter, A.M., vol. i. pp. 175, 176. 1855.

> "At first he appeared like a bird skimming over the surface of the ground; and the rapid pace at which he swept down the gentle slope would have led one to suppose that it must have been some winged animal approaching. The outline of the steed soon became visible, and then the form of the rider crouched close to his back; then the tufted spear projecting far in front; and ere we had surmounted the rising ground, the tattered Arab reined up his noble steed within fifty yards of us. We had viewed this scene with lively interest. Never before had I seen the Arab horse on his native desert; and however exciting were the present circumstances, and however calculated to awaken suspicions of coming danger, perhaps of plunder, yet admiration was the only feeling we entertained for the moment. And when the stranger drew up, and his mare stood patient and gentle, without symptom of weariness or quickness of breathing, but with expanded nostril and proud eye, I could see at once why the Arab loves his horse. The horse is everything to him. Money he cannot use to advantage, and his simple wants are easily supplied. His few sheep or camels gather their food from a parched soil, which no other lord claims. A genial clime makes rich clothing — such a costly toy to the denizens of the city and to civilised nations — of little use to him. A tattered garment will serve him for years, and the simple furniture of his tent is generally hereditary. What, therefore, would be money to him? But his noble horse will carry him swiftly over the parched desert, to the side of the devoted caravan or solitary wanderer; and when danger threatens, he will as swiftly convey him beyond its reach."

The Arab cannot show more attachment to the companion of his wanderings over the deserts of the East, than the poor Indian of North America sometimes manifests to his rougher steed amid the grass and flower-filled prairies of the West. Lieutenant-Colonel Emery* speaks of a Maricopa Indian, without saddle or stirrup, coming into the camp at full speed, balancing himself to the right and left with such ease and grace as to appear part of his horse. The horse was alarmed at the novel apparition of the party forming the encampment. A young officer offered to buy the horse. The Indian "caressed the horse's neck, at the same time shutting his eyes, meaning thereby that no offer could tempt him to part with his charger." How unlike the horse-selling propensities of similar classes in Europe, who are proverbial for the readiness with which they part with this kind of property! The mares of the Arabs not unfrequently belong to more than one family, who severally keep the pedigrees of their favourite horses, so that it is sometimes rather a difficult matter, according to Col. Chesney, to purchase one. The Arab horses deteriorate when removed from their deserts, and lose many of the peculiarities by which they are distinguished: the climate and difference of treatment may readily account for this.

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* "Military Reconnoissance between Missouri and California," p. 84.

In some of the northern parts of Asia, mare's milk is used in a prepared form, called "koumis,"—a form in which it would come under the drinks forbidden to members of temperance societies. This "koumis," when taken in quantity, has an intoxicating effect on the drinker of it. Sauer* describes the manner in which the nation of the Yakuti make this. The mares are milked twice a-day, and the milk is collected into large leathern buckets called "symirs;" these are formed like a bottle, wide at bottom and narrow at top; into each of these a small piece of the stomach of a calf or colt is thrown, and some water is then poured into each. A stick, wide at the end, is used to stir this mixture, and it is kept in constant agitation by this means until it ferments. The milk thus acquires an acid taste, which is very agreeable to the race who use koumis; although it cannot be admitted into the number of the liquids which "cheer but not inebriate." Every one collects as much koumis as he can, and "the cellars" of some of the chiefs contain more than five hundred ankers of it.

The Ass belongs to the same family as the horse, and there are two species of the genus mentioned in the Scripture. The common ass of the East is a much finer animal than the variety met with among ourselves, so celebrated for his patience, and stubbornness, and the hard treatment which he usually receives. In the Bible, we read of the domestic ass being employed in husbandry; the Jews were forbidden to plough with an ox and an ass together (Deut. xxxiii. 20). With sheep, and oxen, and camels, asses formed part of the riches of the Patriarchs (Gen. xii. 16). Job is recorded to have had a thousand she-asses (xlii. 12).

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* "Expedition to the Northern Parts of Russia," p. 116.

Abraham rode on an ass when he went with his son Isaac to Mount Moriah; and it was not till the introduction of the horse into Palestine that the rich left the use of the ass to the poorer classes. He who was despised and rejected of men, was to come "unto the daughter of Jerusalem, lowly and riding upon an ass, and upon a colt the foal of an ass," as prophesied by Zechariah. This was literally fulfilled, as recorded by the Evangelists.

But there is another ass mentioned in the Bible,—the wild ass (*Asinus hemionus*), who "scorneth the multitude of the city, neither regardeth he the crying of the driver," whose house is the wilderness and the barren land his dwellings (Job, xxxix. 5–8). This fine animal is still met with on the plains of Assyria, where it is conspicuous for its freedom from all restraint, and being "loosed" from all "bands." In fleetness, according to Layard, it is equal to the gazelle, and there are but few horses that are able to overtake it.

On some slabs which were found by Mr. Loftus in the Palace of Assur-bani-pal at Nineveh, there is a most life-like representation of the pursuit of a herd of wild asses on one of the Assyrian hunting-grounds. About twenty of these children of the desert are being pursued and harassed by mounted horsemen, who follow with their large and powerful dogs. The colts are shown in these admirable bas-reliefs trotting away by the sides of their mothers, who seem to slacken their pace to enable the young things to keep up with them. Some are pierced with arrows from the bows of the horsemen, while others are pinned to the ground by the dogs, or having their speed diminished by the savage bite of a canine pursuer. One wild ass seems to have been struck in the heart as it rears in the air, much as animals do when wounded in this fatal spot. On another part two men are pulling at a lasso, with which they have caught their prey by the neck. On this frieze, the wild ass is represented in every attitude likely to be assumed in pursuit; and it is evident that the artist must have derived his design from studies of the wild animal on the field, so much of life and vigour being expressed on the sculptured slabs. Our engraving (p. 378) represents a small portion of this slab.

The Arabs of Mesopotamia frequently capture this beautiful animal when young, and generally kill it at once for food. It is almost impossible to take it when full grown. When young, Layard* says they are very playful and docile. One he had at Mosul followed him like a dog.

The late Mr. Richardson† informs us, that at Mourzuk, the people, in order to avert the evil eye from their gardens, put up the head of an ass, or some portion of the bones of that animal. The same superstition prevails over all the oases that stud the north of Africa from Egypt to the Atlantic; but like other superstitions, the people are unwilling to explain what especial virtue exists in an ass's skull. From some of these people, however, we may learn, as did Mungo Park, how to manage a refractory donkey. During his first journey, one of these creatures getting obstinate, his negroes cut a forked stick, and putting the forked part into the ass's mouth, like the bit of a bridle, tied the two smaller parts together above his head, leaving the lower part of the stick of sufficient length to strike against the ground, should Master Donkey venture to attempt to put his head down. After this the ass walked along quietly and gravely enough, taking care, after some practice, to hold his head sufficiently high to prevent the stones or roots of trees from striking against the end of the stick, which experience had taught him would give a severe shock to his teeth. This contrivance, Park was assured by his fellow-travellers, always proved effectual.* A. W.

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* "Nineveh and Babylon," p. 270.

† "Mission to Central Africa in 1850, 1851."

DIVINE THOUGHTS *IN* THE FACTS OF CREATION.

THE STELLAR UNIVERSE.

From our own planet and our planetary system we ascend to—

III. The Vast Concave of Stars.

The magnitudes, the distances, the velocities connected with the solar system, are mensurable, though incomprehensible. We cannot here grasp in our conception the results of calculation. But the calculation can be made, and the results can be relied upon with perfect certainty. Between the solar system and the stupendous sphere of stars, in which it is the merest atom, there is this essential difference, that the latter is absolutely immeasurable by us. Of the number of the fixed stars, of the magnitude of a single one of them, we know literally nothing, and even of the distance of the nearest of them, all that is known is this, that it must be more than twenty millions of millions of miles, because, if it were only this much, this could be ascertained by the methods of geometrical astronomy. But how much more than this it is distant cannot be ascertained. Of one thing we are perfectly sure, that since beyond this distance the stars are seen by us, their magnitude must be enormous, and they must be surrounded by an inconceivable intensity of light.

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* "Travels in Africa," p. 49.

It is more than conjecture which represents these mighty orbs as not single stars, but systems, each a sun, around which may revolve a multitude of planets, attended, perhaps, by their satellites. It is a conclusion founded on analogy so strong that it may almost lay claim to the certainty of induction. No one doubts that the solar system, at a distance sufficiently great, would appear but a single star, and that all its light, direct and reflected, would be reduced to a point. These stars in boundless space, the nearest more than twenty millions of millions of miles distant from us, and myriads of them immensely more distant still, must *they* not be systems thus concentrated and reduced? But imagination is confounded and stupified by what reason so distinctly presents.

The effect is yet more insupportably oppressive when, from those multitudes of stars that are seen by the naked eye, and the multitudes more that are revealed by a telescope of ordinary power, all of which are not simple stars, but systems of stars, each with a central sun and revolving planets, we pass to what are called the nebulæ in the sky. Every one is familiar with the milky arch which is often seen to span the circuit of the heavens. It appears to the eye, and even to the ordinary power of the telescope, as if it were thickly sprinkled with what has been significantly called starry dust. But, by higher telescopic power, it is discovered that every atom of that dust is indeed a star, or rather a system of stars, so distant that its light can be discerned only when blended with that of other stars and systems; the whole together yielding only a thin, fleecy, dissipable whiteness. The idea of number that is here suggested, and of distance, and of magnitude, the idea of the myriads on myriads of spheres that people immensity, overwhelms all thought, all imagination.

But the nebulæ are not confined to the milky way, they are scattered in great numbers over all parts of the heavens. They appear as dim, cloudy spots, patches of the thinnest vapour. But each particle of that vapour is discovered to be a star, or rather a system of stars. These vapoury patches disclose to the powerful telescope their countless orbs. The mind is lost in the vain effort to calculate a sum, which only multiplies the faster as it is attempted to be reduced. Silently, majestically, these mighty spheres and systems, in myriads that defy all computation, seem to repose in the void immense. We are sure that a perfect harmony reigns among them, and are justified in believing that the same laws which operate with resistless force, and with never-failing efficiency here, exert their mighty sway there also.

Of the varying appearances that have been noticed in some stars at different times, of the disappearance of some for a time and their reappearance, of the double stars, the binary systems, many hundreds of which have been observed, and which are seen to revolve around one another in regular periods, we shall not speak. But it must not be omitted that our solar system, and the countless myriads of systems in space, each within itself performing vast revolutions, are conceived to form all together one stupendous whole. The stars in the entire concave which seems to encircle this earth, numberless, perhaps, as the atoms of sand on the ocean-shores, form a glorious unity. Each has its own economy and its own complicated movements, with which the others interfere not. But the whole is conceived to be revolving around some common but unknown centre. Many circumstances have been marked which seem to sanction the idea of such a universal revolution. And even within a comparatively short period, it has seemed more and more probable that astronomers were approaching the undoubted establishment of the theory.

With what sentiments of awe is not the little we certainly know respecting the starry sphere fitted to inspire our minds! It is within the solar system only, indeed, that the inductions and conclusions of science are such as cannot be gainsaid. There we read, by tokens not to be disputed, expressions of thought more profound and more expressive than can be set forth in letterpress. Beyond the solar system the reasoning is only analogical. But the analogies are such as fall scarcely short of the authority of induction. It is perfectly certain that the same physical laws which govern the more limited also govern the wider sphere. And if no more, at least the overwhelming vastness of the sidereal system we know beyond all doubt. And vast as that mighty sphere of stars and systems is, everything we observe discountenances the notion of uncertainty or confusion as attaching to it. It is order we behold—stupendous order. It is a harmony we look upon—a magnificent harmony. Order is the effect of law, and law is the creation of mind. Harmony is the offspring of intelligence. It is the nice adjustment and balancing of relations—the delicate equilibrium of forces, originated by a profound, a far-seeing, and a comprehensive wisdom. Astronomical Science proclaims everywhere an underlying thought, inconceivably grander than the outlying phenomena.

QUÆRENS.

CANDLES AND LAMPS.

(*Concluded.*)

Tallow Candles are cylindrical or slightly conical rods, formed of solid fat, enclosing a bundle of parallel or twisted fibres of cotton, called the *wick*, through which the melted fat is drawn up to the region of combustion, as already explained.

The Wicks employed for the best candles are composed of cotton rovings, imported from Turkey. In common candles, the wick is formed of parallel fibres, and the glycerine, which is present in the fat, being much less combustible than the fatty acids, always produces a carbonaceous snuff at the end of the wick, which can only be removed either with snuffers or by causing the wick to curl towards the edge of the flame, where it is wholly consumed in contact with the current of air. By plaiting the wick in the braiding-machine, it acquires this property of curling. In the finer quality of candles, such as stearic, spermaceti, and wax, the wick is also impregnated with some salt, such as borax, which melts at the temperature of the edge of the flame, combines with the ash of the wick, and finally drops off in the form of a small bead. Tallow, however, from its greater fusibility, is very apt to *gutter* when the wick is thus ready to curl to the one side, unless prevented by being confined in a cap, as in Palmer's candle-lamps, where the candle is inclosed in a vertical metallic cylinder with a cap, whose orifice is smaller than the candle, which is forced upward against the cap by a spiral spring.

In Palmer's tallow-candles, which require no snuffing, one thread of the wick is first impregnated with subnitrate of bismuth ground up with oil, the whole is then bound round in the manner called *gimping*. One, two, or more of these wicks, are wound round a thin rod in a spiral manner, and placed in the centre of the mould, which is then filled with tallow. When the tallow cools, the rod is withdrawn. On burning these candles, the wicks uncurl, and form so many separate flames, and the ends coming in contact with the air at the edge of the flame, are consumed. The same effect is produced by drying the wick to expel the moisture, and dipping them in oil or candle-stuff at a temperature of about 300° or 350° Fahrenheit, then winding them round a cylindrical rod in a spiral manner. They are lastly straightened before the fat imbibed has had time to cool.

The wicks for dip candles are often cut by machinery in a very expeditious manner. Balls of cotton, previously made into loose roving or cord, each consisting of a dozen or more threads, but differing in thickness according to the size of the candles, are put into a box or drawer. The ends are then attached to a rod or broach, and equal lengths of cotton are cut off by drawing a knife along a whole range of them at once, a slight twist being given them by the action of the machine.

Morfit describes another machine much used in America, which is said to cut, spread, and twist as much wick in one hour as serves to make one thousand pounds of candles.

Tallow candles of the cheapest kind are made by repeatedly dipping the wick in the melted fat, and are then called *Dips*, to distinguish them from those made with *moulds*. These latter are cast in cylindrical pewter vessels of the exact shape of the candles, slightly tapering towards the wick end, and carefully polished inside. Glass and earthenware have also been employed as the material for these moulds. The wick is carefully kept in the middle of the mould by acting as a stopper at the tapering end of the mould. This forms the lower end in making the candle, which is reversed when placed in the candlestick. The other end of the wick is drawn tight through an eye in a piece of metal soldered to a point in the margin of the mould.

The tallow must completely fill the mould, which is kept in a perpendicular position, and the candles ought to remain entire, without cracks on cooling, and should be easily removed from the mould. These conditions are attained in proportion as the particles at the sides cool more quickly than those in the interior, but more especially as the tallow is cast at a proper consistence, which the workmen recognise by the appearance of a scum on the surface. Various contrivances have been suggested to facilitate the moulding of candles, and the machine invented by Morgan is that most generally adopted in this country.

In the process of *dipping*, two vessels are used, one for melting a supply, and the other containing the tallow in the proper temperature. The wicks, according as six or eight go to the pound, are hung side by side on a wooden rod or *broach*, sixteen or eighteen together. The wicks are first saturated with hot tallow, and then rounded in the palm of the hand or on a flat board. The dipping is done by a quick, steady motion of the hand, and, after each immersion, the broach is removed to the frames of laths, called *the post*, where they harden. This operation is repeated until the candle acquires a proper thickness.

This operation is performed by a machine, each broach being supplied with a number of wicks, and thirty of these broaches are ranged side by side, and then constitute what is termed a *frame*. From thirty to forty of these frames may be suspended on the same machine, which thus supports, at one time, many thousands of candles.

A vessel of melted tallow is placed in front of each machine, and the frames are brought, one after another, immediately above it and dipped. By means of a lever, moved by a foot, a wiping-board is lowered after each dipping, which removes the excess of tallow from the lower end of the candles. A kind of steel-yard, to which each frame is in turn attached, indicates the successive increase of weight, and enables the workman to ascertain when the candles have been dipped a sufficient number of times, after which they are set aside to harden and dry.

Although the process of dipping is much more laborious than moulding, it admits of inferior tallow being employed for the inner parts, while the best is used for the outer coating or layer. Candles improve by keeping, and become harder, as well as whiter, by exposure to the bleaching action of the air.

The manufacture we have now to notice has arisen from the researches of Chevreul on the Fatty Bodies, which led to the separation of the chief constituents of tallow by a very simple process. Tallow, in a perfectly fluid state, is allowed to cool very slowly, with constant agitation, to about 100° Fahrenheit, at which point the *stearine* only has become solid, in the form of numerous small crystals, which swim in the fluid portion. This pasty mass, subjected to the ordinary hydraulic pressure, loses all the fluid portion of the tallow, the *oleine*, which is imbibed by the woollen cloths, and leaves a solid cake of stearine, which is obtained of greater purity by repeating the operation.

Now these two substances, *stearine* and *oleine*, belong to a class of bodies called Salts, just like Glauber or Epsom salts, green or blue copperas. Both contain the same base, oxide of glyceryle ($C_6 H_7 O_6$), combined, in the one case, with a solid acid, ***stearic***, and in the other with a liquid acid, *oleic*, which acids have many of the properties of the fatty bodies from which they are separated. The stearic acid, however, has been proved by Heintz to contain, in some cases, a large proportion of palmitic acid, already named as the characteristic acid of palm-oil. For example, mutton suet is composed of one part stearine and ten parts palmitine.

The great improvement in the production of candles dates from 1831, the imperfect combustion of the wicks being remedied by soaking them in borate, phosphate, or sulphate of ammonia, &c.; and the large grain of the crystals being overcome by using small quantities of arsenic, which prevented the crystallisation, but which was subsequently superseded by a little wax.

Stearic Acid.—The method of obtaining this substance will be readily understood by referring to our previous remarks. The tallow is decomposed by lime, which, being a stronger base, separates the oxide of glyceryle from its acids, which being set at liberty, dissolves in water; the result being, a mixed compound of lime with stearic and oleic acids, is decomposed by sulphuric acid into an insoluble sulphate of lime, and a solution of stearic in oleic acid, which are separated from each other by crystallisation and pressure. The fatty acids are washed first with dilute sulphuric acid, and then with pure water. The pressure is also assisted by heat, so as to remove the last traces of oleic acid, and the cakes of the solid stearic acid are bleached by exposure to the air.

While this process was gradually gaining ground for the introduction of the stearic-acid candles, a new art has been acquiring an enormous development, founded on the same basis, but accomplishing its end by different means, and we will now trace its history.

We have already alluded to the action of the strong mineral acids on the fatty bodies, and this new art relates exclusively to the saponification of fat by means of sulphuric acid. To Chevreul belongs the honour in the first instance, but Fremy, perhaps, most clearly exhibited the relations of fats to sulphuric acid in 1836. He proved, that while lime and the alkalies only combine with the fatty acids, setting the glycerine free, the sulphuric acid united to both, forming conjugate or double acids, thus sulpho-stearic, &c., acids on the one hand, and sulpho-glyceric acid on the other. The first are not very stable, water decomposing them into slightly modified fatty acids insoluble in water, while the sulphuric acid with the latter (sulpho-glyceric acid) dissolves in the water.

Gwynne, in 1840, suggested an application of these facts, and proposed distilling the fatty acids *in vacuo*, but his process was not economically successful, and the same fate attended Clark's plan of separating them without having recourse to distillation.

The next step was the process of Dubrunfaut, who proposed to heat common oils to a high temperature, and pass steam through them; but the production of acroleine was so great that no workmen could be found to endure the pungent and irritating action of the substance on the eyes and throat.

In 1842, Jones and Wilson combined these plans of *sulphuric*-saponification and *steam*-distillation.

Further improvements followed in heating the fat to 350° Fahrenheit, and *the steam itself*, after leaving the boiler, instead of depending upon the temperature of the fat for this purpose.

These processes enable Mr. Wilson to work up fats the most fœtid and impure, the waste of the glue-maker and the oily residues of the woollen factories, into the higher class of candles, white, inodorous, and dry to the touch; and certainly they present an attractive combination of chemical and mechanical science.

We will now briefly describe these two different modes of working up the fatty bodies for our modern stearic acid candle.

1. *Description of the Lime Process.*—Several tons of tallow, with a quantity of water, are thrown into a large wooden vat, containing a coil of steam-pipes, pierced with small holes. The steam being turned on, soon melts the tallow, and raises the water to a brisk ebullition. A quantity of lime, in the form of a fine cream, is added, and the ebullition continued until the saponification is perfect. As already explained, the lime combines with the fatty acids, forming what is termed *Rock-Soap,* while the oxide of glyceryle unites with water, forming a hydrate, which we have often named under the term glycerine.

The Rock-Soap is crushed to small pieces between fluted rollers, and is then placed in vats lined with lead, supplied with a perforated copper steam coil. When the boiling-point is reached, sulphuric acid is added, and the oily acids float on the surface under the cognomen of *yellow matter.* This yellow matter is run off by cocks into large spouted vessels, called *Jacks,* and poured from these into flat tin-moulds. The residual sulphate of lime is washed with boiling acidulated water to remove all adhering fat, and then sold as manure.

The cakes of yellow matter are interleaved with cocoa-nut mats, and subjected, between iron plates, to a pressure in the cold of six hundred tons in a vertical hydraulic press, by which a large portion of the oleic acid is removed.

This *cold-pressed* acid is *refined* by melting with steam, and treating again with a little dilute sulphuric acid to remove any oxides of iron, &c., and finally allowed to cool and crystallise.

These refined cakes, when cold, are put separately into a linen-bag, interleaved with cocoa-nut matting and iron-plates, previously heated by steam, placed in the trough of a horizontal hydraulic press, likewise heated by steam, and then subjected to great pressure for some time. The remainder of the oleic acid is removed by this operation, and the cakes are refined a second time, when the product is considered pure.

The subsequent moulding of the candle is attended with the precautions we have already named, and they are exposed to the action of the air and moisture to allow the surfaces to undergo a process of bleaching and improve their appearance.

They are then washed in a weak solution of carbonate of soda to remove all dust and other impurities, placed on a linen sheet, and subjected to gentle pressure under a cushion of linen, which dries up the moisture and communicates a degree of polish.

The last operations are *cutting* and *polishing*, which are performed by a machine, in which a revolving saw cuts the ends smooth, and a series of cylinders and rollers working together with an endless woollen cloth-belt, completes the final polish.

The oleic acid is manufactured into an inferior soap, and employed in the preparation of woollen goods.

2. *Sulphuric Acid and Distillation Process.*—A large quantity of fat, or palm-oil, is melted by means of steam and allowed to settle, when it is pumped into a strong sheet-copper boiler, in which it is heated to a temperature of 350° Fahrenheit, and submitted to the action of concentrated sulphuric acid. The operation lasts some time, and,

after the violet hue has disappeared, the contents of the boiler are run off into a cistern two-thirds filled with water, while a current of steam is admitted to assist the washing process.

The fat is then transferred to metal-stills, where it is heated to 560° Fahrenheit by an open fire; and low-pressure steam, previously heated by passing through a system of iron-pipes in a furnace, is forced up through the mass. The current of steam carries with it the fatty acids, and thus facilitates the operation. The mixed vapours pass through a series of pipes retained at a temperature of 212° Fahrenheit, where only the fats separate, while the steam is carried to a second range of pipes, exposed to a current of cold water for condensation.

The residue, after the distillation has been carried as far as practicable in this still, is then removed to another still formed of iron pipes, set in a furnace, and there submitted to a much higher temperature and a jet of steam still more strongly heated. The residue is a sort of pitch, in which form it is sold and applied to the ordinary purposes for which this substance is used.

The highest-priced candles are still made in the ordinary moulds, but a machine is in use at the colossal works of Messrs. Price and Co., at Belmont, for moulding ordinary stearic acid, cocoa-stearic, and composition candles, which, in discharging one set of candles from the moulds, re-wicks the moulds for the next process of filling. The small conical tops of the moulds employed with this machine are moveable, and can be pushed down into the cylindrical part of the mould, but, on returning to the top, are prevented by a rim from passing beyond the cylinder. The moulds are arranged side by side, eighteen in number, on a frame, and for each mould there is a reel, capable of containing sixty yards of wick, inclosed in a box attached to a frame. To have some idea of the process, we must suppose a frame of moulds, full of candles, with the wicks protruding at the top, and still in connexion with the reels, brought into a horizontal position exactly in front of a set of plungers which the workman draws forward by means of a lever. Each plunger is thus pressed against the conical cap of a mould, and, in forcing it into the cylinder, ejects the candle, and carries a portion of wick into the mould to be coated by the next charge of melted fat. The candles are projected, and a piece of wood, covered with flannel, moving on a hinge, and cut out to fit the candles, is pressed upon them for the purpose of holding them firmly; while a circular-knife arriving at the instant, which cuts off the wicks of the finished candles, leaving a portion intended for the following charge protruding from the moulds. The prominent portions of the wicks are now firmly clasped by a number of forcipes attached to a rod; the plungers are then drawn back, taking with them the conical caps of the moulds and tightening the wicks; the whole frame, wick-box and all, is then inverted, the conical end downwards, on to a pair of rails at the side, where a boy pushes it forward toward a hot closet, where it acquires the proper temperature before being filled. The fat is contained in a cistern, above the rails, in which it is kept at the melting point by steam-pipes; and as each frame is brought under it after leaving the hot closet, the moulds are filled by as many cocks or outlets from the cistern. The frames travel to the end of the rails, which are of considerable extent, and, when the fat has solidified, the forcipes and superfluous material are removed, and the frames transferred by a travelling truck to a parallel set of rails on the other side, to be brought again opposite the plungers, when the candles are expelled. Each machine has, on an average, 200 moulds, each mould contains 18 bobbins, and each bobbin, when first cottoned, 60 yards of plaited wick: so that, when the seven machines in Price's factory are at work at once, there would be a length of 800 miles of candles on hand!

Six descriptions of stearic candles are made at the Vauxhall Works, differing in the material whence the mixture of the fatty acids is derived. *Belmont Sperm* is made from *hot-pressed palm acid. Belmont Wax* is of the same material, but *tinted* with *gamboge* to give it the appearance of wax. The best *Composite* candles are a mixture of *Belmont Sperm* with *cocoa-nut stearine.*

The No. 2 composition of this firm is employed in preparing the *Albert Night-Lights,* which are short thick cylinders of fat, with a very thin wick, so proportioned to the diameter of the cylinder that it shall burn 6, 8, 9, or 10 hours. These are made in a metal frame, perforated with a number of cylindrical holes, to each of which there is a moveable or false bottom, with a thin wire projecting upwards in the centre. The cylindrical holes being filled with the molten fat, and this having cooled, the bottoms are forced up by a lever, and the cylinders of fat all ejected at the same moment, each pierced with a central hole for the wick. The wicks, previously impregnated with wax, rendering them stiff, and having a small piece of tin as a support for the bottom, are quickly and dexterously inserted by children, the bottoms made fast by suddenly pressing the wick'd cylinders on a warmed porcelain cap, which melts the fat in contact with the piece of tin. These lights are burned in small glass cylinders, into which they fit. Child's Night-Lights are made by pouring the melted material into cylindrical card-board boxes, and Price's Night-Lights are similar, but made from a cheaper material.

Spermaceti Candles are moulded in the same way as those composed of stearine or stearic acid.

Wax Candles.—Wax is not adapted for moulding, in consequence of the contraction which it undergoes on cooling, and the tenacity with which it adheres to the sides of the mould. The mode of preparing these candles is analogous to the *dipping* process; but instead of dipping the wicks in the melted wax, they are *basted* with it.

The wicks having been previously warmed are attached to a hoop of wood or metal, and suspended over the melting vessel. While the wick is kept constantly turned round its axis by the fingers, hot melted wax is poured slowly over it from a ladle, beginning about 1½ inches below the loop; by turning the hoop the next wick is put through the same operation, and so on until they have all received their first *basting.* The position of the wicks is reversed before more wax is poured over them, and the free portion of the wick is covered with a cap or tube of tin. Wax is again poured upon the wicks in succession, turning them round as before. When the candles have attained a proper thickness at the bottom, which is of course the thinnest portion, the basting ceases. In order to make the cylinders uniform, they are taken hot from the hoop, and kept at a proper temperature between hot flannel, and while still warm, they are moulded upon a wet table with a rolling board. They are basted a third time, and again rolled and cut to a certain length. On breaking a wax candle, the annular layers, like the year-rings in wood, can be easily counted, and their number indicates the number of *bastings.*

The large church candles are made by placing a wick upon a slab of wax, bending this together, and then rolling the whole mass.

The long, thin, coiled wax tapers are drawn in a peculiar manner. The wick, which must be very uniform, and wound on drums, passes from the latter into the wax pan, at the bottom of which a guiding-roller is fixed, and from thence through a draw-plate to a second drum. The draw-plate, similar to those for wire-drawing, consists of a metallic disc, with holes corresponding in size to the diameter of the taper: these are round therefore, when the taper is to be cylindrical, and in the shape of a star, then the taper is to be grooved.

In China, the candles which every one uses at night inside of their grotesque lanterns, and of which there is such an enormous consumption in the worship of their idols, are made by dipping the wick in their vegetable tallow and coating them with the white insect-wax. They are coloured red by a small quantity of alkanet root, and green by means of verdigris. In this country wax candles are coloured,—*Blue*, with artificial ultramarine; *green*, with verdigris alone, or mixed with emerald green; *yellow*, chrome yellow; *red*, vermilion; *pink*, madder lake.

We have already alluded to the paraffine candle, and we add the following table, which exhibits, at a glance, the comparative value of different kinds of candles for purposes of illumination:—

Kind of Candles.		Grains of Material consumed in 4½ hours.	Light from an equal Amount of Material.	Illuminating Value or Light obtained for a certain Fixed Amount of Expenditure.	Relative Price of Material.
Paraffine	4 to the lb.	525	1·000	1·000	30
Spermaceti ..	6 ,,	540	0·826	0·620	40
Wax..	4 ,,	552	0·450	0·519	26
Artificial wax ..	5 ,,	642	0·760	1·086	21
Ordinary stearic acid	4 ,,	822	0·543	1·018	16
Tallow	6 ,,	1020	0·450	1·350	10

T. R.

OURSELVES.

RESPIRATION.

THE mechanism of the Chest and Lungs well deserves attention. In shape the *Thorax* or *Chest* is somewhat like a beehive: more strictly, it is a hollow Cone, truncated above, and flattened behind. The masonry of its walls is strong and compact. They are constructed of the twelve vertebræ of the back, fourteen true and ten false Ribs,* and the breast-bone; in all thirty-seven bones, firmly fastened together, yet all, more or less, moveable. Auxiliary to them are the Collar-bones and Shoulder-blades; whose more immediate use, however, is to form the shoulder-joints.

The Ribs are joined *obliquely*, not horizontally, to the back-bone. At first sight this might appear to be unimportant; but we shall see that it greatly facilitates the act of breathing.

A large expanded muscle, called the *Diaphragm*, attached to the edges of the lower ribs, extends across the bottom of the chest, and separates it from the cavity of the Abdomen.

Between the edges of the Ribs are two strata of muscles, called the *Intercostal Muscles*, the fibres of which differ in their direction, but not their use. Some large portions of other muscles assist in giving strength and solidity to the walls of the chest, over which is spread the common integument.

The interior of the chest is lined by a strong, smooth, transparent membrane termed the *Pleura*. There are, however, really two Pleuræ, which, like two well-moulded sacs, placed side by side, fill the greater part of the cavity and line the whole inner surface, except two spaces, one immediately under the breast-bone, the other in front of the backbone. These are named by Anatomists the *Anterior* and *Posterior Mediastinum.* Through the latter of these the large blood-vessels, going to and from the heart, the trunk of the Absorbent Vessels, and the Nerves which supply the lower parts of the body, &c., pass up and down.

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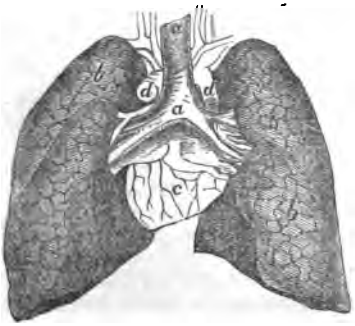
* This distinction is almost only anatomical or descriptive. The true ribs are bony throughout their whole length: the false ribs are shorter than the true, they differ in length, and are united to the breast-bone by cartilage.

The upper part of the Cone is occupied by the windpipe, the œsophagus, the arteries, and veins, which convey the blood to and from the head, and several muscles.

At the upper part of the interior of the chest both the Pleuræ are folded down and form the outer covering of the Lungs. The *Lungs* are two large, spongy, cellular, expansible organs, which, with the heart, nearly fill the whole cavity of the chest. Though apparently separate, and commonly spoken of as the right and left Lung, they are not quite distinct from each other; for they receive the air through a common tube, and the blood through a common vessel.* Their form corresponds almost exactly to the inner surface of the chest. Their outer surface, which is free and disengaged, in its whole extent, is covered by a reflexion of



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* A tolerably accurate idea of the general figure of the lungs, and their relation to the heart, &c., may be formed from the annexed sketch: *a a* is the trachea or air-tube, dividing into its respective bronchi; *b b* the lungs; *c* the heart; *d d* the arch of the aorta.

the Pleura, as before mentioned. It is smooth, nicely polished, and kept constantly moist with a thin limpid fluid. Each lung is divided, by deep fissures, into lobes; the right into three, the left into two lobes.

After respiration has taken place, the Lungs are proportionately lighter than any other organ in the body. This arises from their *cellular structure.* The shape and size of the cells vary a good deal. For the most part they are polyhedral or many-sided. An ineffective attempt to number them has assigned 1744,000,000 to each lung. Their surface, if extended, would certainly equal, at the very lowest computation, 150 square feet. During a full inspiration, the capacity of the Lungs for air averages, in an adult, at about 120 cubic inches. This, however, necessarily varies with the different sizes of different persons. Their weight differs as much; ranging from 18 to 53 ounces, and averaging at 35.

Over the air-cells are spread the innumerable branches, into which the pulmonary artery and the four pulmonary veins become subdivided. By repeated divisions they form at last an exceedingly delicate network, so delicate, that the blood in the blood-vessels is separated from the air in the air-cells by a wall only the 1000th part of an inch thick.

In the air-cells the little tubules terminate, which convey the air into the lungs. They are the minute and ultimate ramifications of the two *Bronchi,* or branches, into which the Trachea, or windpipe, divides, just opposite the upper part of the breast-bone; one branch passing to the right, the other to the left Lung.

The *Trachea,* or air-tube, is composed of from sixteen to twenty cartilaginous rings, piled horizontally one upon another. They are not, however, complete circles in the human species; being deficient and only membranous at. their hinder part, where it is in contact with the œsophagus

The rings are separated from each other, yet united together by membrane, and thus form a continuous channel, lined within by a very sensitive mucous membrane, and covered without by a strong connecting fibrous membrane.

By the alternate expansion and contraction of the Chest and Lungs *Breathing* is performed. By coincident acts, and just as if by common consent, the Ribs are raised from the oblique into an horizontal position, and their lower margin is turned outwards; the breast-bone is elevated and protruded forwards; and the Diaphragm descends and becomes flattened. This simultaneous play of parts enlarges the capacity of the chest. Immediately the outer air streams in and the lungs are distended. After a slight respite the Ribs sink again, the Breast-bone subsides, and the Diaphragm relaxes; the Chest becomes contracted, and the principal part of the air is expelled. These alternate movements occur, in a person who is at rest, about fifteen times in a minute—about once to every five pulsations of the heart. By them the lungs are continually receiving new supplies of air, and voiding it in perpetual alternation.

Few persons know the use of breathing, and yet three most important purposes in the human economy are fulfilled by it; for the *blood becomes aërated and purified*, the *temperature of the body is kept up*, and, secondarily, the *voice is generated.*

In common with all other organised bodies, whether vegetable or animal, we need the constant influence of atmospheric air. Life can neither be developed nor maintained without its agency. It seems to be more necessary than our daily food; at least, we can live much longer without food than without it. No seed will germinate, no egg can give birth to the smallest insect; from the lowest to the highest, sooner or later, every individual in every form of life perishes, if deprived of air. Upon the sap in the leaves of plants, through the skins and air-tubes of insects, in the gills, and in the lungs, it exerts an energising and purifying influence, either by introducing oxygen, or eliminating carbon, or by both.

It would be difficult for the reader to understand how we are *kept warm* by breathing, unless he was previously made acquainted with two facts, well known to chemists. The first is, that the matter of Heat, or Caloric, can and does exist in many substances in a *latent or quiescent state;* by which, however, their temperature is not raised above the temperature of surrounding objects; and, also, that by a change in their condition, either mechanical or chemical, it becomes evolved and obvious. The other is, that different substances have different capacities for caloric; and so has the same substance (to speak a little less accurately, perhaps,) in different conditions.

These two particulars, among many others connected with the subject of heat, were first discovered by Dr. Black, about the middle of the last century. Twenty years later they were ingeniously employed by Dr. Crawford to explain how the temperature of the body is constantly kept at the same uniform standard—at 98°—while the temperature of the atmosphere, and of surrounding objects, is almost always a good deal lower, and is continually varying.

It had long been known that the blood in the arteries and in the veins was of different colours: in the veins and right side of the heart, of a dark purple hue; in the left side of the heart and in the arteries, of a bright vermilion colour. It was also known that this change, from venous to arterial blood, was brought about, in some way or other, in the lungs. Animal chemistry then showed that the alteration was produced either by the *oxidation* of the blood —by oxygen imbibed into it,—or by its *decarbonization*— by carbon liberated from it,—or (and this is now the commonly received opinion) by both.

Dr. Crawford found by repeated and well-conducted experiments that the blood thus changed,—that arterial blood,—has a greater capacity for heat than venous blood, and that in it it becomes quiescent or latent. He also found, and this is most remarkable, that the air which we expire has a smaller capacity for heat than the air which we inspire has. For during respiration the air is altered as well as the blood. When received into the lungs the atmospheric air ordinarily consists of 21 of oxygen, and 79 of azote or nitrogen. While it remains in the lungs it loses from 2 to 6 per cent of its oxygen, and obtains an equal quantity of carbonic acid gas. Its capacity for caloric is lessened and heat is liberated; which is transferred to the arterial blood and becomes latent in it. The intercepting membrane, which separates the blood in the bloodvessels from the air in the air-cells is (as we noticed before) so thin that it neither prevents the chemical changes which both undergo; nor does it hinder the transfer of heat, from the air into the blood, which takes place in consequence of those changes. Little by little during its diffusion over the system the arterial blood parts with its oxygen. It again becomes venous. In consequence of which its capacity for heat is lessened, and heat is set free. Again it returns by the veins, through the heart to the lungs, to be re-purified and re-warmed.

This "Theory of Animal Heat," though seemingly damaged a good deal by some subsequent experiments, has borne the test of time, and is now by most Physiologists considered to be the true explanation of the function.

If the temperature of the atmosphere and of the bodies which surrounds us, is below 98°—our own degree of heat —as it commonly is; then we are cooled partly, either by *radiation* or *communication* of caloric to them, as other substances, whether organic or inorganic, are cooled; and partly by *insensible perspiration*. When the temperature of the air is above 98°, or if by exertion the body would be overheated, then we are kept cool by larger amounts of the insensible, and by the *sensible perspiration* or *sweat*, with which the surface becomes dewed.

On the top of the trachea the *Larynx* is fixed, like a capital on the summit of a column. It is an irregularly-shaped musical box, constructed of separate pieces of cartilage, or separate cartilages fastened together by suitable ligaments. Anatomists differ about the number; some say there are nine, others only five pieces. It will facilitate the reader's acquaintance with them if we assume that there are but five, and that the other four are offsets from these. They are named the* *Thyroid*,[1] the *Cricoid*,[2] the two *Arytœnoid*[3] cartilages, and the *Epiglottis*.[4] This last, of a semi-oval shape, is attached to the base of the tongue, and forms the flap by which the air-tube is most accurately closed during the act of swallowing. The *Thyroid* cartilage consists of two broad laminæ, placed angularly in respect of one another. The projection thus formed may readily be felt in the forepart of the throat. Under the thyroid, and immediately in connexion with the upper end of the trachea, to which it is firmly attached, lies the *Cricoid;* it is ring-shaped, and completely circular. On the upper edge of the cricoid cartilage, at the hinder part, the two *Arytœnoid* cartilages rest, side by side. They are of a pyramidal shape, the apex being placed upwards. The *offsets* form points of attachment for muscles, and contribute to the perfection of the instrument.

An abundant supply of muscles provides for the accurate adjustment of the whole apparatus, and of each separate part. It is well furnished with nerves of both kinds: for sensation and motion. Two ligaments extended from the angle of the thyroid and fixed in the arytænoid cartilages form the *proper vocal cords.* Other two, above them, stretched in the same direction, but less definitely constructed, are called the *superior or ventricular* cords.

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* These are rather hard, but they are not unmeaning names. 1 signifies, like a shield; 2. Like a ring; 3. Funnel-shaped; 4. Upon the windpipe.

The fissure between the vocal cords is termed the *Rima* of the Glottis.

By the vibrations of these cords the *sound of the voice* is produced.

We intended to describe the remarkable powers of this beautiful instrument; and to particularize the services rendered by the tongue, the palate, the lips, the teeth, and the other auxiliaries, when we speak or sing. We thought of saying something about the function of *secretion*, and of pointing out several of its curious varieties. We meant to notice the *hair*, the *nails*, and the *skin:* to remark upon the care with which all the machinery is *arranged* and *packed*, with reference both to its *security* and *usefulness:* and to direct the reader's attention to the *regularity*, the *constancy*, and the *consent* of the movements of the different parts: but these intentions are void; for, our little series of sketches ends here. They are confessedly, and indeed, of necessity, imperfect, and only in outline. If, however, the reader has been interested and, perhaps, instructed in some matters relating to himself, about which he ought not to be either uninterested or ignorant: and if, especially, he has been led to reflect upon and admire the wisdom and goodness of his Divine Creator and Lord—constructing him so skilfully, and endowing him so liberally—then, the purposes for which these papers were written have been attained.

P. S.

THE SHIPWRECK OF ST. PAUL.

CANTO III.

BUT now the fainting Afric breeze
Falls breathless on the sinking seas:
From all the far horizon round
A stillness, lurid and profound,
Spreads slowly o'er the crouching deep,
That, in its terror, feigns to sleep.
Some creeping horror petrifies
The expectant sea: the awful skies
Are flushed with a mysterious pain;
As one, exorcised all in vain,
On whom the demon springs again.

Struck down in that portentous calm
  The heavy sails collapse,
While, loosened sudden from their strain,
  The swinging cordage flaps.
With nervous arms more sternly strung
  The sturdy rowers bow,
And the sullen sea, reluctantly,
  Still parts before the prow.

Now moaning winds are faintly heard
  To battle far aloft,
The ruffian North swift charging down
  On the South, sobbing soft.
And a long low ripple rears itself
  Against the northern sky;—
Swept up before the raging storm
  Higher, and yet more high,

With gathering strength it rolls along
  Nearer, and yet more nigh.
Swift, swift as death, the monster comes,
  Lifting the livid deep,—
Smooth, green, and vast;—a moment past,
  And, with a hollow sweep,
It springs upon the opposing swell,
  And all the whirling air
Fills with white, wounded arms of spray
  Flung up in wild despair.

The blind sky, bowed upon the sea,
Blackens, convulsed with agony:
The fierce Typhoon,* with sounding sweep,
Now drowns the roaring of the deep,
And now the waves, to madness driven,
Silence the stormy voice of Heaven.
Entangled in the tempest's wheels,
The fated vessel, staggering, reels:
Each starting timber creaks and groans,
The grinding spars in shriller tones
  Shriek to the ruthless wind;
While the rent sails, and cordage snapped,
  Float out in shreds behind.
And in the pauses of the storm,
  Dull, deadened gurglings show
How fast the insidious leakage gains
  Upon the hold below.

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* These typhonic appearances were owing to the sudden shifting of the wind from south to north: the northern, or rather north-eastern gale, which produced this commotion by meeting the southern breeze, was itself a steady point-wind, lasting at least through the fourteen days and nights.—*See* Mr. Smith's "Treatise," chap. iii. p. 55–60.

Swift, swift, the hurtling hurricane
Spins southward o'er the boiling main:
Like a stunned creature, rising slow,
The ship recovers from the blow,
And staggers back to face the foe.
But now the strong north-eastern gale,
Heavy with volleys of thick hail,
Strikes her betwixt her quivering eyes,
  And, dashed aside, she veers,—
Yet, still into the fierce head-wind
  The steady helmsman steers;—
Once more she struggles to the strife,
  Though but again to fail,
Until the master gives the word
  To scud before the gale.

And fast before the gale they drive
  For many a stormy mile,
And run at length beneath the lee
  Of Clauda's sheltering isle.
There, toilsomely, they drag on board
  The foundering, shattered boat,
That in Fair Havens, that same morn
  So gaily seemed to float:
And bind the vessel's starting planks
  With circling undergirds,
—The swelling sides which that same morn
  Were buoyant as a bird's.
But short the time for musing now,
  And short the time for prayer,
Though the Centurion's conquering faith
  Stood on his slain Despair.
For, let the fierce Euroclydon
Rage as it will, he hears alone

How the poor Jewish prisoner's Lord
Fulfils his servant's warning word.
Though blackest shades blot out the sky,
The veil drops from his inward eye,
And shows the Truth, so lately won,
Still clear, still spotless, still his own :—
Shows that the darkly threatening cloud
That lately o'er her brightness flowed,
Rose not from her : was but a part
Of his own weak, mistrustful heart,
That now in one broad sea of praise
Reflects the glory of her rays.

As Clauda's sinking headlands fail,
Once more they fly before the gale ;
And while the ship gives way apace,
A fresh alarm pales every face.
How shall they 'scape the Syrtis sands,
That grimly stretch their wrinkled hands
  Under the shallow sea,
Eager to snatch the helpless prey,
  Fast drifting to the lee ?
Through that mad-howling storm the crew
  Can catch no human sound ;
But steady eyes watch lip and hand,
And see the master's mute command
  To wear the vessel round.
With storm-sails set, and useless gear
All lowered, and the decks made clear,
Pausing once more, she doubtful sways,
But soon the guiding helm obeys ;
North-westward turns her shattered prow,
And fiercely on the starboard bow
Beats the relentless tempest now.

The last grey gleam of stormy light
  Is blotted from the clouds,
And choking darkness, starless night
  The seething ocean shrouds.
The long night past, day dawns at last,
  And shows how still the gale,
Heard through the dark in ceaseless roar,
Lashes the watery threshing-floor
  Beneath its sounding flail;
While, light as chaff on every side,
The severed spray flies far and wide.

Again the dark, with strict embrace,
  Strangles the gasping light,—
Again the struggling morn reviving
  Escapes the fainting night.
But wan and pale;—no change, no hope;
  Nor sun nor moon appear;
The plummet-stars, by angel hands,
  Dropped from the third bright sphere,
Night after night have failed to sound
The black and fathomless profound.

And now a stupid, blank despair
Settles on every visage;—where
The lines of hope and fear were strong,
And wrestled for dominion long:
On cheek, and lip, and eager brow,
All is swept smooth and vacant now.
But, while with bloodshot eyes they gaze
Each on his fellow's stony face,
  A well-known voice they hear,
That brings their courage back to life
  With words of earnest cheer.*

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* Acts, xxvii. 21–26.

For the resistless fire of Faith,
 The soul's electric stream,
Pours on them with the speaker's breath,
Till, in the very jaws of death,
 Despair melts like a dream.
And well remorseful Julius weighs
Each strong, direct, undoubting phrase,
That, flying from the heart of Paul,
Finds entrance in the hearts of all;
And marks the unastonished tone
In which he makes the vision known;—
Fears not to trust the Truth at large
Within her own all-powerful charge;—
And, cramped by no fastidious doubt,
Speaks the full fact sincerely out,
And styles his God, with steady nerve,
He "Whose I am, and whom I serve."

The fourteenth night is come, and still
 The tempest blows as strong,
And still through Adria's darkening waste
 The vessel drives along:
But, as the midnight watch is set,
 Above the wailing deep,
A muffled roar, unheard before,*

---

* The ship, it must be remembered, lay with her head to the wind, and, making due allowance for lee way, her course from Clauda to Melita would be N. ¼ W. Entering St. Paul's Bay in this direction, she would first pass the Point of Koura, its S. E. horn, and the warning sound of breakers would then be first heard, and heard almost *astern*, as the vessel drifted sideways into the bay.

After a while the sound would die away as she neared the centre of the bay, and would again be heard, but now on the lee-bow, as she drew towards its N. W. corner.

The dry exactness of these notes will be pardoned by those who con-

Forewarns them of a rock-bound shore,
  On which the breakers leap.
Soon, as the vessel sideways drifts,
  The mariners discern
The surf that, scarce two furlongs off,
  Comes tumbling close astern.
Now, hastening aft to heave the lead,
  Fathoms twice ten are found;
And soon the breakers, eastward left,
  Roll with a smothered sound.
"Now fix the windlasses astern,[*]
  Fitted with cables four,
And summon every hand to drag
  The anchors from the prore,
That when the morning dawns, we yet
  May run the ship ashore;
But, ere they grapple with the ground,
  Heave out the lead once more."
Now while the fifteen-fathom line
  Tells of the shallowing sea,
That hollow roar booms up once more,
  Loud on the vessel's lee;
Each moment more distinct, till now
It sounds close on the larboard bow;
Then promptly at the Master's call
From the high stern the anchors fall;

---

sider the importance of accuracy in anything touching Scripture. For a clear and full exposition of the subject see Chap. IV. of Mr. Smith's Treatise.

[*] "The proximate cause of anchoring was no doubt that assigned by St. Luke, namely, the fear of falling on the rocks to leeward; but they had also an ulterior object in view, which was to run the ship ashore as soon as daylight enabled them to select a spot where it could be done with a prospect of safety: for this purpose the very best position in which the ship could be, was to be anchored by the stern."—*See* Mr. Smith's Treatise, chap. iv. p. 92.

Heavily passes night away,
And slowly comes the wished-for day.
Slowly the heavy folds withdrawn
Reveal the first faint hints of dawn;
No longer heard and felt alone,
Within the tossing ship,
The monstrous billows rolling on
Upturn the yawning deep;
But, sliding 'neath the glimmering light,
Their jagged crests appal the sight.
Near thrice a hundred anxious eyes,
As slow expand the widening skies,
Are fixed upon that iron coast,
On which the plunging breakers tost,
Now rise in founts of angry spray,
And now, with strong recoil,
Drag crushed and mangled fragments back,
As baffled Adria's spoil:
And brave hearts shudder as they read
Their ghastly fate too well portrayed.

'T were long to tell in measured strain
How all those fears proved false and vain.
And, far as memory can look back
Along life's hazy, narrowing track,
We fail to find the early time
When first that shipwreck scene sublime
Was painted on our hearts;
Familiar from our childish years,
Far as we gaze it still appears,
Complete in all its parts.
By youngest fancy drawn so plain,
Who would re-touch the sketch again?
To risk the spoiling of its bloom,
Or place another in its room?

How well upon our hearts is drawn
The opening of that anxious dawn;
  And how the prisoner Paul
Took bread, and thanked his God, and broke,
And ate before the crew, and spoke,
  Cheering the hearts of all;
Saying that not a single hair,—
So safe were they in God's good care,—
  From off their heads should fall;
And how, when all had eaten free,
They cast the wheat into the sea.

Next, as the fuller daylight burned,
  And they knew not the land,
How anxious eyes a creek discerned,
  With a small beach of sand;
Where minding to thrust in the ship,
They weighed their anchors from the deep,
Shook out the artemōn afore,
  Loosed either rudder-band,
And boldly made towards the shore
  Where lay the creek and strand:
How, driving in, they found the tide
Had worn a passage, channelled wide,
Where two opposing currents met
Behind the isle of Salmonet,
  Thus severed from the land:
And how the hapless vessel's prore,
  Stuck fast in sand and mud,
The while astern, with fierce uproar,
  Rushed in the raging flood:
And then how, every peril passed,
All safely reached the land at last.

But though all this, and more than all
  That later musings win,
Is bound up in the first bright sheaf
  That Memory garnered in,
And bound so close that all in vain
  We strive to chase away
The fancy quaint that still persists
  That shipwreck scene to lay
Within some old familiar haunt,
  Some sunny English cove,
Where, in the long departed years,
  Our steps were wont to rove:
Yet, dreaming thus, perchance we fail
To grasp the substance of the tale.
Then pardon the presumptuous song
That thus has fondly lingered long
On the old theme, and made it new,
With variations strange but true.

The mightiest Singer of the Greeks,
('Tis thus a hoary legend speaks,)
Stood blind amid the trancèd throngs
Hurrying, soft-paced, to hear his songs.
His fame, a living, breathing flood,
Surged to his feet; and yet he stood
Grandly unconscious, though the quay
Of Chios shone in one broad sea
Of sunlit heads, that with the swell
Of Troy's great epic rose and fell.
And still, yet in far different wise,
Blindness hangs thick in poets' eyes:
He sang to crowds, and felt alone;—
We dream of listeners, and have none.

Yet if perchance some earnest ear
This borrowed tale has bent to hear,
Nor closed itself in angry haste
Against the dull, officious waste
That toils to gild refinèd gold,
Loading with rhyme the sea-tale told
In such sincere and graphic phrase,
By one who all those weary days,
Immured within the tossing ship,
Drifted through Adria's foaming deep,—
If such there be, then, ere we part,
The pungent moral lay to heart.

For though the tale, divinely told,
  Is just as purely true,
As if its straight, bright warp of story
  No woof of meaning knew;
Yet, ne'ertheless, a moral fine
Runs interlacing every line:
Teaching how true those words of Heaven,
"To him that hath shall more be given;"
While we, half-hearted ones, shall lose
The faith we have and fear to use;
Unless God's kind severity
Blacken with storms our sunny sky,
That wrecked upon some rugged strand
Our souls may yet escape to land. F. A. P.

REVIEW OF THE MONTH.

UNSUCCESSFUL authors—and successful authoresses—are apt to say hard things about the booksellers; and if evil imaginations do not occur to themselves, they are sure to be suggested by friends, who, mingling a little malice with not a little flattery, exclaim, "And do you say that that is all you got for your book?" Dr. Johnson got fifteen hundred and seventy-five pounds for his Dictionary, and Boswell once said to him, "I am sorry, sir, you did not get more." His answer was, "I am sorry too. But it was very well. The booksellers are generous, liberal-minded men." We subscribe to this deliverance which a sense of justice extorted from the gruff moralist. No doubt there are exceptions; but, just as we believe that of the learned professions the physicians are the most humane, so among the trading and mercantile professions we are inclined to think the booksellers the most generous. These remarks we have been led to make in connexion with the name of Mr. David Bogue, the well-known publisher, who died very suddenly on the 19th of November. It is only a small portion of his liberal and kind-hearted deeds which have come to our personal knowledge; but these are enough to assure us that many of those tears will be shed for him which fall on the good man's grave. Quiet and too retiring, he was a man of excellent ability, and was gifted with a keen æsthetic instinct, which enabled him to detect and bring forward authors and artists who, but for his hearty patronage, might have remained unnoticed or obscure. Honourable and upright, and, like other first-class publishers, disdainful of all quackery, he was remarkably successful in business; and many of our most beautifully illustrated works, as well as many of our most popular poems, bear his imprint, and of a popular series for the young he was himself the author. Exemplary in every relation,—as a husband, father, citizen, and member of the Christian Church,—and exceedingly endeared to his intimate friends, Mr. Bogue's early and unexpected death has diffused through a wide circle a deep sensation.

Under the title, "Records of Longevity," Mr. T. Bailey has compiled a very curious and amusing volume; and with the motto, "Diligent in business—fervent in spirit," Mr. Owen, a Church-of-England clergyman, has given us a lively, wise, and warm-hearted biography of Mr. Thorneycroft, a Wesleyan layman. It would be hard to find a more charming example of the "poetry of science" than Dr. George Wilson's little volume, "The Five Gateways of Knowledge;" and no poetry, commonly so called, has appeared within the year which we have enjoyed so much as Gerald Massey's "Craigcrook Castle." The "Mother's Idol Broken" is sadly touching, and some of the war-songs have the force and fire of Pindar.

A twofold treat has been provided for those who love the good and the beautiful combined in Grahame's "Sabbath," illustrated by Birket Forster, and in the "Book of the Patriarch Job," illustrated by John Gilbert. The designs of the latter come up to our idea of what a pictorial "Job" ought to be; not mere drawings of dry museum specimens, on the one hand, nor the half-heathen rant and exaggeration of draughtsmen, like Blake and De Loutherbourg, on the other; but modest and suggestive renderings of the text, where the imagination and feeling of the artist bring latent meanings into relief, and aid the reader's eye, as music aids the listener's ear.

If we remember aright, the same New-year's day ushered into existence the first number of the "Library of

Biblical Literature," and the first number of Lardner's "Museum of Science and Art," as well as the first number of ourselves. Many of our contemporaries have long since expired; but the two above-named have lived, and have received the encouragement which they well deserve. The idea of each series is so nearly akin that we name them together; and, as companions to our own miscellany, we would heartily commend them both to our readers,—the one with its physical science popularised, the other with its admirable elucidations of Scripture.

Want of time and space prevented our noticing last month the interesting meeting of the Young Men's Christian Association, held on 25th September, to take leave of Mr. T. H. Tarlton, on his retirement from the office of Honorary Secretary. The report of the proceedings is appended to our present number, and by many of our readers it will be perused with lively interest. From the retirement of Mr. Tarlton, we should have apprehended disastrous consequences to the society, were it not that his place is to be filled by one so worthy of being his successor, and who has already done so much for the best interests of the Association, as Mr. W. E. Shipton.

From statistics compiled by "The Christian Witness," it appears that there are now in the world 88,250,000 Protestants, and 159,000,000 Roman Catholics. Of the Protestants, Great Britain (excluding Ireland) and the United States contain equal numbers, or twenty-one millions each; and of the entire number, a majority, or forty-eight millions, speak the English language. What a proud pre-eminence this gives to Britain and the United States; and what a motive to cordiality and co-operation between countries, which, with their heritage of light freedom and commercial prosperity, if true to their opportunity, might be the teachers, the evangelists, the regenerators of the world!

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THE END.

London:—Printed by G. Barclay, Castle St. Leicester Sq.

YOUNG MEN'S CHRISTIAN ASSOCIATION.

Report of a Social Meeting, held September 25, 1856, for the purpose of presenting a Testimonial to Mr. Tarlton, on his retirement from official connexion with the Society.

SAMUEL MORLEY, Esq. *in the Chair.*

A Hymn having been sung, THE REV. W. NIVEN, B.D., Incumbent of St. Saviour's, Chelsea, invoked the Divine blessing.

THE CHAIRMAN then said,—My dear Friends, it is, I assure you, with very mixed feelings that I find myself taking a part in the proceedings of this evening. I offered to the Committee with great cheerfulness any services they might feel disposed to call upon me to render in connexion with this evening's engagement, in the full hope that Mr. Gurney, the Treasurer of the Committee which has lately been formed in connexion with the movement which terminates to-night, would be found to occupy this position, leaving me the opportunity of a very few words expressive of my sympathy with the object which calls us together this evening. I feel at this moment that I should be thankful to occupy some quiet seat, where I could be a silent spectator of the interesting engagement upon which we are just entering, not because of any want of interest in the object which calls us together, but because there are aspects of the question which are to myself personally deeply affecting. It will be unnecessary for me to give you any statement of the circumstances which have led to our meeting to-night. Of course you are aware that our dear and honoured friend, Mr. Tarlton, has felt that, for reasons which are to himself satisfactory, he must terminate his connexion with the Young Men's Christian Association as its Secretary. I am not one, here at all events, to call in question the motives, or rather the reasons, which have influenced my friend. I am bound to believe that my own feelings of personal attachment have interfered with that cool, calm judgment on the question, which is necessary in order to arrive at a right conclusion in respect to it. All, however, who know anything of the conscientiousness of our friend—as all must who know him at all—will believe that the reasons which have actuated him must be sufficient, and therefore we are here to-night to tell our friend, not in any language of flattery or adulation, but to let him distinctly understand, that in relinquishing the post which for twelve years he has occupied with so much honour to himself and with so much advantage to us, he takes with him the love, the respect, the confidence of all who have known him and have been associated with him. For the reason I have intimated, I feel quite unequal to occupy, even if it were right to do so, much of your time; but I desire, as an employer, to express my thankfulness to Mr. Tarlton for the services he has rendered to the young men of London. My belief is, that there are numbers—ay, thousands—of young men who will have reason to thank God through eternity that it was their privilege to enjoy the friendship and to excite the sympathy of Mr. Tarlton. To me, it has always been a matter of congratulation and thankfulness that there was found in connexion with this noble institution a man who possessed two emphatic requisites for the post our friend has held—wide, noble catholicity of principle and opinion, together with unmistakable sympathy with young men. Now as to the first, my friend and I, holding opinions on certain ecclesiastical questions, which are very inconsiderable as to their importance when we look at the objects which we are seeking to promote by means of this Association, have been able to work together with hearty, pleasant harmony, never having a word that approached to a jar on that subject. We have known nothing of Church or Dissent here. Our one desire has been to seek in those who are connected with the working of this great movement for evidences of a singleness of purpose—a desire to promote the glory of the Great Master in the attempts that are made spiritually to benefit and to bless the young men of London. That has been the qualification, and I trust, by God's blessing, it will ever be the only qualification we shall seek here as the condition of hearty co-operation in this great work. I desire also, as an individual, to express my thankfulness that it has been my happiness to enjoy the friendship of Mr. Tarlton. From a conviction of the practical wisdom and prudence which have regulated the affairs of this Association, although nominally a member of its Committee, I have very rarely attended its meetings, and have had little to do with its practical working, although intimately and constantly acquainted with its progress, and always ready when it was felt that I could do anything to promote the objects we have in view, to render any kind of co-operation that I might be called upon to offer. But it has been my happiness to take pleasant and profitable counsel often with my friend. My spirit has often been cheered and my purpose strengthened by the common-sense view which our friend has taken of objects not connected with the Association — efforts and movements of a somewhat kindred character with which he, in common with myself, has felt sympathy. I therefore look with a mournful feeling to the fact that, at all events for a time, our friend is about to remove from us; and, in conclusion, I desire to express my fervent prayer that God's richest blessing may accompany him into that retirement to which, for a period, he is about to commit himself; and that, in His good time, it may please Him to bring our friend back again to us, that we may find him attracted to some sphere of usefulness in this great metropolis, in connexion with which we may have the enjoyment of seeing him occasionally among us, and have the prospect of some kind of co-operation, of which I am very sanguine, in connexion with some of the thousand forms of usefulness which are the glory of the age in which we live. These are the feelings which oppress me at the present moment. I do, in spite of the feeling of hesitation, rejoice greatly in being here to-night, and in uniting with you in these evidences of love and attachment to our friend; and I trust the result of our meeting will be to satisfy him of that which I am sure he never could have doubted — the firm and distinct hold that he has upon the affections and respect of the young men of this metropolis.

MR. PURSER, addressing Mr. Tarlton, said: — Dear Sir, on behalf of the young men connected with this Association, I have the pleasure of publicly testifying their esteem and regard by this humble memorial [a silver inkstand and library candlesticks], which I beg you to accept. It will be needless for me to express the deep regret that your retirement has caused; but permit me to express our hope that, in whatever sphere you may be engaged hereafter, those with whom you may be connected may appreciate as highly as we do your disinterested earnestness and affection.

MR. W. R. RICKETT, also addressing Mr. Tarlton, said,—Dear Sir, it has fallen to my lot to be the spokesman of others of the members and friends of the Association, who desire to add to the memorial just received an expression of their regard, which, if less permanent, may be more useful. The utterances of their hearts on this occasion would, with mine, abound with affection and gratitude. Recognising at the outset that for all you are and have been amongst us, the glory belongs to Him whom you have served in the Gospel of His Son, we feel that this is an occasion on which we may be permitted to review some of the services which you have been permitted to render to the Association and to young men. The recollection is fresh upon the minds of some here present of the day in which you first took your place in our devotional meeting, to offer to us those words of earnest counsel and loving solicitude which, in the long interval of more than eleven years, have so often guided the perplexed, strengthened the weak and weary, and given consolation to hearts lonely amid the busy throngs of this great city, or stricken under the sense of sin and moral degradation. From this point, we may notice the general relation of the work of the Association under your guidance to the change which has taken place in the position and circumstances of commercial young men. We believe that, in many cases, to your personal influence and counsel do they owe the improved social arrangements of the houses of business—the kind provision now so generally made of libraries and means of recreation; while you have directed the energies of such of us as have been anxious to do good to our fellows, and to bring to bear upon each day's intercourse and business transactions the power of that godliness which hath the promise of the life that now is. For nearly the same period you have conducted the Bible-class formed at your own suggestion, and made, by God's grace, the channel of blessing to so many of our number. We owe also to your suggestion the public lectures delivered before the Society with increasing interest, popularity, and usefulness, year by year. Nor ought we to omit the remembrance, that to your labours on our behalf have often been added the cares of sickness and suffering brought on by your unremitting toil, and rendering necessary at times your absence from our company. We gratefully remember that these very seasons of absence have been made subservient to our profit, and have been used by you in obtaining information which has been placed on all occasions at the service of our own and branch-Associations in the country. To the ability, judgment, and zeal with which you conducted the earlier labours of the Association, we owe that general favour and acceptance by which the Committee have been enabled to make provision for the comfort and instruction of young men, in Gresham Street and at this place; and that we are enabled to meet the necessities and serve the interests of those who, in the absence of family or religious association, would be destitute alike of home and friends, and be exposed to the unrestrained influences of the temptations of this great metropolis. And since, in the providence of God, we are about to lose your much-valued services, we are constrained to express our united feeling of deep and unfeigned regret; our thankfulness to God, for sending you amongst us to do a certain work; and our gratitude towards yourself for the efficient and disinterested manner in which you have performed it. And as a tribute of our affectionate respect and esteem, we now ask your acceptance of the sum of money contained in this purse [500 guineas.] In taking a farewell of you in the position you have been wont to occupy amongst us, we would commit you into the safe keeping of God, praying Him that as to this day you have continued, through His grace, faithful in the sphere in which He has placed you, your future course may be increasingly blessed in your being the instrument of turning many from the error of their ways into the glorious freedom of the Gospel; and that joy and peace may be abundantly multiplied unto you, in seeing the work of God prosper, and that God's favour may be manifestly felt in every relation which in His providence you may be called to sustain. Permit us to add, that though your presence be withdrawn, it will long be felt in our hearts and memories, and not a few of us carry to this day beneficial influences very precious, derived from our connexion with you, which will abide in our hearts as so many testimonials to your name.

EDWARD CORDEROY, Esq.—Dear Sir, I view the retirement of Mr. Tarlton from the post of Honorary Secretary to this Association as a very important event in the history of the Society. I am not quite prepared to say that I deeply regret it; I am prepared, however, to say that it is an occasion which ought to call forth all the earnest prayers, all the devout considerations, and all the holy resolves which, on your knees before God to-night, you can make to serve the Institution in the future more faithfully and devoutly than you ever have done. Mr. Tarlton has served this Association so long,—has guided its affairs so well,—has been accepted by the public as its representative so cordially, and has won so thoroughly, as you have heard to-night, the esteem of the employers of young men,—has been intimately associated with so many hundreds and thousands of young men, that it certainly must have been a very clear and unmistakable call of duty which could have drawn him to another sphere. But, then, our opinion of Mr. Tarlton would not have been well founded if he were not prepared with good, sound, and sufficient reasons to justify his course in the eyes of every reflecting and considerate member of the Association. I am quite persuaded, that when he rises to-night his statement of the reasons which have led to his present course of action will satisfy us that he has acted wisely and rightly. I am not, therefore, prepared to say that I deeply regret Mr. Tarlton's retirement from this place. Reasons associated with his own domestic happiness, as we have learnt while upon our knees to-night—reasons also, I believe, intimately associated with his conviction, that it is his duty to enter upon a higher and holier sphere of labour, have operated upon his mind to produce his present course. If, indeed, Mr. Tarlton had proved an unfaithful teacher of young men; if his character had so far become bankrupt that he would have been no longer a fit example to young men, then we might have had cause for deep, and lasting, and sincere regret: but that Mr. Tarlton should be called to a higher and holier sphere of usefulness, that he should become a better and more valuable member of society than he is at present, I really can scarcely see to be a matter of regret to any one of us; nay, rather, instead of regretting that we are about to lose Mr. Tarlton just now, on the grounds upon which he is leaving us, let us rather rejoice that he has been spared to us so long, enabled to work so efficiently, and by the grace of God to maintain so spotless, and upright, and consistent a character.

"All earthly comforts vanish thus;
So little hold of them have we,
That we from them, or they from us,
May in a moment ravished be."

"Yet we are neither just nor wise,
If present mercies we despise,
Nor see not how there may be made
A thankful use of what we've had."

Then, dear friends, it will be rather surprising if a man, with all the marked characteristic excellences of our friend Mr. Tarlton, has not, in his intercourse with the young men in this room, and with multitudes of others, impressed their minds so thoroughly and so well, that there are many of them disposed to emulate the example of his past labours, and strive, as far as in them lies, to fill up the void which will be made in this Society. It is to be hoped, indeed, that there are many young men in this metropolis whose characters have been moulded mainly by our friend, and in those Bible-classes in which it has been his delight to labour, have been, by the influence of the Spirit from on high, scripturally taught and trained to usefulness under his guidance. He is about to leave us; and I am sure every heart in this room will do, as many a heart throughout the country will do,—offer up earnest prayers to God that he may be guided, and blessed, and made more abundantly useful. Many a mother in the country, who has followed with her prayers and her tears her son to this metropolis, so full of danger and temptation, has uttered Mr. Tarlton's name with the most affectionate regard. And when the report of this meeting reaches many a country home, I am sure that many a knee will be bent before the Throne of Grace, and many a prayer will ascend to Heaven that God's blessing may rest upon him, whatever he does and wherever he goes. His services in connexion with this Society will long be remembered and appreciated. We shall miss him—miss him in the room up-stairs in all that genial cordiality and courtesy with which he was wont to greet every one present; we shall miss him in our social and friendly gatherings such as these, where his quiet, unobtrusive, but effective provision, always arranged things so admirably, that there never seemed to be any lack of interest; we shall miss him in the Exeter Hall meetings, where, whether he had to deal with the speaker, the lecturer, or the chairman, every one was by his forethought and kindness set perfectly at ease; you will miss him in your Bible-classes up-stairs Sunday after Sunday, where he was accustomed, in the kindest of tones and in the wisest of lessons, to endeavour to impress upon your minds the great truths of the holy Gospel. You will miss him in many ways. But I am sure that he, who is now about to undertake the highest and holiest engagements of social life, and who will probably undertake the highest and holiest duty with which God can intrust a man on earth, will be sustained in all the relationships of life by your most fervent wishes, your most devout and earnest prayers.

MR. GEORGE WILLIAMS said:—I have had within the last fortnight a great number of letters from different parts of the country; and I would, if I could, on this occasion give some utterance of the love and affection which those letters breathe. They were from young men who once shared in the privileges and advantages of this institution; and so enriched are they by the wisdom and grace of our dear brother, that they are now, so to speak, developing some of the great practical truths it was their privilege to learn from him. One or two lessons are suggested to us, I think, by our dear friend's character. First, that of implicit faith in God; thoroughly throwing the whole soul into the present duty, leaving the future to the Providence of God. Then those of us who have come very near to him have found something of that holy cheerfulness which indicates nearness to God. Again, you know his solicitude for others, especially for those in anxiety. How many young men have come to me, and said that they have been to Mr. Tarlton, and derived satisfaction from the counsel he has given and the interest he has taken in them! Now, cannot we in this matter follow his example? From my intimacy with him for a number of years I know something of his anxiety for souls; and, dear friends, as members of the Association, we must be careful to cultivate as best we can the wisdom which he has displayed in this respect; otherwise the great work of this Association—that of leading men to lay hold of Christ and Him crucified—may in some degree suffer. In order to show the results of the practical working of this Association, let me mention three cases which may be encouraging to our dear brother's heart; for I am not aware that he knows of them. One is the case of a young man who attended one of the fortnightly meetings; and God was pleased in His infinite mercy to awaken in his mind and conscience concern for his spiritual interests. That young man has been diligently studying the word of God; and after due preparation, is now a minister in the West of England, faithfully and fully preaching the Gospel of Jesus Christ. Another young man who attended the lectures at Exeter Hall, while listening to one of them felt inwardly determined to be a Christian, and devoutly and reverently dedicated himself to the Lord Jesus. That young man has passed through the university, and is now a clergyman in the Church of England. The other case was that of a young man, who, from his connexion with the institution when in Gresham Street, was brought to appreciate spiritual things. He has been removed by the providence of God from London, and is now the editor of a newspaper in the country having the largest circulation of any in the district; and he attributes much of the good influence and the right feeling which he possesses, to his connexion with this Association. Mr. Morley has said, that perhaps thousands of young men have been benefited by their connexion with Mr. Tarlton; these are three instances that have come under my own personal observation, out of the number to which the Chairman has referred. I am quite sure we do indeed wish our dear brother every possible blessing that his heart may desire in the future of his life. One can hardly imagine that Mr. Tarlton won't be at Exeter Hall; but we must try, if we can, to get Mr. Tarlton's Master with us. In our various social meetings and Bible-classes we must all seek for another baptism of the Holy Ghost; we must try, now that we have lost our crutch, to seek for more and more of that Divine strength which is the power, and will be the ultimate triumph, of the grace of God in many young men. I could say much that my heart would suggest of personal friendship and affection, but I prefer to leave the subject with these few words.

MR. G. F. MABERLY.—It has been my privilege to be connected with the Society from an early period of its history, and when resident in London, I was an active member of the Committee. I feel, this evening, that we are losing one to whom we are exceedingly attached — one whose equal I hardly know. I have often felt great benefit from half-an-hour's conversation with Mr. Tarlton when he could kindly give the time, for he has opened up to me new views, by which my mind has been relieved and comforted; and I feel that, from the great breadth of mind which he has always displayed, my own mind has derived a certain amount of expansion. He has generally presented something original, embracing a very large view of the subject in hand, though I do not pretend always to have agreed with him. Another thing that has struck me exceedingly has been the singleness of purpose with which he has always acted, and I feel that to this we owe, to a great extent, the present prosperity of this Society. His whole object has been to serve his Master and to benefit young men, and accordingly he has gone straight to his point without having had any selfish views whatever. Many men might have made a capital thing of the position he has occupied, but on his part there has been the most profuse generosity and liberality. I do not know a single individual who has been so willing to spend not only his money, but himself; and I have sometimes almost trembled when I have seen the nervous state of excitement to which his abundant efforts have brought him. I said to Mr. Tarlton the other day, "You have to thank God for this one thing, that you have been enabled to conduct the affairs of this Society with such success for twelve long years without having made a single enemy." It might have been easy for him to have made friends by a little compromise, but I have never known this; he has always spoken the truth firmly, decidedly, yet kindly, and in such a way that, whatever may be his convictions, and however strongly expressed, they have left no sting behind. It is a great privilege to have been blessed in this way, and I trust that we ourselves may learn a lesson from it. I hope to go home this evening resolved, by God's blessing, to learn these few lessons myself; and I trust you will all go away with the same feeling. I am sure our dear friend takes with him the love and the prayers of each one of us. He takes with him, not only the 500 guineas which we have presented as a memorial, but he carries away what is of much more value to him—our hearts. I will only add, that I pray God to keep him as He has kept him—to preserve him faithful unto death, and finally to receive him into His heavenly kingdom, that there he may be associated with those amongst whom he has laboured, through all eternity in never-ending bliss.

THE REV. THOMAS BINNEY.—All that we have heard is what you all feel, and what every one of you would say, if you were to rise and speak. It does not need to be repeated or amplified, and we are now only suffering delay in not hearing Mr. Tarlton himself. I am here altogether unexpectedly. I called in on my friend Mr. Morley this morning, when he mentioned to me the business of this evening, and asked me if I could make it convenient to be present; and I made it convenient; I felt that it would be a great gratification to myself. I have long known and highly respected Mr. Tarlton. I was surprised to hear what was about to occur, for I could hardly imagine the existence of this Association without Mr. Tarlton. I was not at all prepared for it; it came upon me like a great discovery in science, something wonderful in nature, that Mr. Tarlton was going to leave the Young Men's Christian Association. But hearing that that was the case, and the other circumstances which Mr. Morley mentioned, I certainly made up my mind to be present, just to partake of the gratification which I know will be universal. I hope that Mr. Tarlton has not conducted the business of this Society as I have known some men conduct the business of institutions—so cleverly that everything depended upon themselves, upon their personal presence and their personal exertions, so that when they fell everything fell. You may smile; but depend upon it, in all institutions where an individual has been evidently for a long time a successful leader there is some danger, for when he leaves another may not be easily found to supply his place. I have known such cases; I have known ministers who have so completely done everything in connexion with schools and various other institutions, that the whole thing depended upon their personal influence and presence. Now I think one of the great secrets in conducting affairs of this kind is to teach people to carry them on by themselves. And I hope that may have been the case in the present instance. A thought has occurred to me while I have been listening to the speeches and looking at this beautiful present and that valuable purse, that if Mr. Tarlton had not the consciousness that he has done worthily in the past, this would be the most miserable night, and these speeches would inflict upon him the most intense torment, which can possibly be conceived. There is nothing so terrible upon earth as praise which we do not deserve. Just as censure or abuse which does not come home to the conscience, which the conscience feels it can throw off as unjust, cannot harm you, so praise which you are conscious you do not deserve is the most dreadful torment to which a man can possibly be put; and if Mr. Tarlton, in looking back upon the past, had not the consciousness that by God's grace he has been enabled to give himself to the work to the utmost of his ability, and, with whatever imperfections, in a way that he could look upon with gratitude to God, he could not receive this with any pleasure—he could not hear what has been said but with great pain. Let us ever remember, dear friends, the great principle of Divine government; let us remember that our great reward will be in the gracious dispensation of Providence, that we shall be fitted for what God has made us. God will have produced upon our hearts that state of feeling, that our blessedness will be the natural issue from it. I am very happy to be here to-night to participate with you in the feelings and expressions which have been uttered. I can bear witness to the usefulness of Mr. Tarlton's labours. He is one of those men that can make everybody work. I am sure I should never have delivered a lecture if it had not been for Mr. Tarlton. One great point about him has been the consummate tact with which he has got everybody and anybody he fixed his eye upon, to come and assist in the work of the Association: I believe, if he had made up his mind to get Prince Albert he would have succeeded. I was saying that but for him I never should have lectured. It was really his influence that overcame my repugnance. After his request there came an obligation, a feeling of duty, so that I could not draw back; and when I undertook the task I tried to do it as well as I could. The two principal lectures I delivered, somehow or other, curiously grew into books; these have been largely circulated in America, this country, and elsewhere; and I have heard of many persons by letter, and I have seen young men personally, who have attributed under God the greatest blessing man can receive to these publications. Now that result is principally to be attributed to Mr. Tarlton. But I must keep to my text; and the only thing I shall now say is, that as we have made a presentation to-night to Mr. Tarlton, I hope the time will come when he will make a presentation to us—that we shall have a meeting when he will present to us Mrs. Tarlton.

Mr. TARLTON rose amid loud cheers, on the subsidence of which he said:—My dear Sir, and Christian friends, if it were possible to delegate the service that now devolves upon me I would give the testimonial itself, if I could get out of the pain that I am suffering, in the way of an adequate acknowledgment. If it be difficult for others to take any part in a service of this kind, how much more difficult for me, when there are so many lines all converging into my personal heart, making this night so memorable and so affecting to myself! I wish I could put a window in my heart, that you might just see what is there and end the whole matter. If I could do that I should then have a hope of acknowledging the affection, the respect, the really undeserved esteem that have been expressed to me in various ways to-night. Let me, therefore, say, that I most sincerely thank you. In accepting these expressions of your affection and respect, I will endeavour just to indicate to you the light in which alone I can regard them. I do not, my dear friends, accept them as any pay for my services. If I thought they came with any such intention I should leave them where they stand, and not remove them. Love can only be paid by love, and services for souls or for Christ can only be rightly paid by a right appreciation of them. I am not undervaluing that which is in itself so valuable in thus speaking, but rather indicating the light in which I do accept them, and how I shall continue to regard them while they continue my property and for my use. I just take them from you with a deep and devout gratitude as expressions of affection and respect. I am thankful that you have said upon this very beautiful inkstand that it is "for services to young men;" for if there be one thing in which I desire to rejoice more than another, it is that during the twelve years I have been with you I have cared for nothing, by God's grace, so much as for the young men to whom I was sent, and for whom I was originally asked to labour. You will forgive me, therefore, in throwing myself upon your sympathy and kindness—for I dare not continue in the region of my feelings—and I will indicate to you what has been my apprehension of duty in connexion with the step that I am about to take. But before doing so let me say that there is something to my own mind really very affecting in the form in which this testimonial comes. I cannot continue to live with you, but in this testimonial you will really live with me. There will be light upon my study table from those candlesticks, and there will be ink in that inkstand which, if God shall spare my brain, my heart, and my character, may be used in some compensation and return for the love I have received from you. Then I have decided as to the use I shall make of what you have so munificently bestowed in this purse: I shall furnish my house with it, so that you may really live with me, that I may every day see you in that form, and not live without you. I will not make so unlovely a subject as myself a topic of remark, any further than just to indicate to you the reasons why I came to the conviction that it was my duty to relinquish this post of influence and of really great service. I do so at once. I believe thoroughly in the hidden conviction and force that determines a man's spiritual action. I am a law to myself, and I must act according to my conviction, however little that action may harmonise with the opinion or convictions of others. I am under necessity to do so. I started in life, my dear friends, with the conviction that I was called to the ministry. My dear and beloved friend, Mr. Williams, knows that at the time he wrote the letter asking me to devote myself to this work I was engaged in preparation for the ministry. I have ever regarded the work to which I gave my attention as only an *interregnum*. After the most conscientious, and, I hope, prayerful deliberation, I could not consent to abandon the original desire and conviction of my spirit in relation to the preaching of the gospel. I therefore continued in the work to which I believed I was really called by the providence of God, until I could see the time for relinquishing it; not when it was a time of difficulty, not when it was a time of depression, but when, by God's grace, the Association was just reaping some of the fruits of the seeds that had been sown and the labour that had been bestowed. I saw that in God's providence there were many men raised up, I believe in every respect competent to carry on the work of the Association, and more competent in very many ways than I am. You will not, I hope, understand me as advertising any humility on my part in saying this. I am not. It was God's great gift of grace to permit me to begin the leading of this work, and from that peculiar circumstance there has grown about me personally, and my name, an interest I believe not belonging to them really. But I can say with some degree of confidence, that I leave the Association at this time, under a conviction that you will have one thoroughly competent, equally devoted, and equally willing to undertake the work that I have been undertaking, in the person of my dear friend and brother Mr. Shipton. And here let me, before adding another word, ask in behalf of Mr. Shipton such an amount of sympathy and consideration as every reasonable mind, not to say every Christian mind, should extend to him under the circumstances. I am sure that he has — as I believe he knows full well — not only the complete confidence and affection of my heart, but a really large amount of sympathy, because I know distinctly that there are some men more swift to criticise than to consider, more ready to find fault than they are to heal or to soothe. Let me say, therefore, that if there be any unfavourable contrasts made, let a spirit of forbearing kindness and of large-hearted charity be extended towards Mr. Shipton. Wait, and judge nothing before the time of judgment. He has to make his influence. If I have been occupying the chief place in the Association, another man cannot have occupied the same place. There can be in a sense but one centre, and that centre must be out of the circle before another man, whatever his gifts, and whatever his influence, can be in the right position for his full character and force of mind to be brought to bear upon the work to which he is committed. Let there be, therefore, a large-hearted and kindly consideration and sympathy, and you will soon find, if I err not, that they have not been misplaced, in really regarding him as the *bonâ fide* successor of him who is now addressing you. I, therefore, having been guided by God's providence, as distinctly and as marked as I desired for my own conviction of duty, to enter into such relationship as will have its conclusion in marriage, have resolved that my married life should not be, in any sense of the term, a contrast with my bachelor life. Now you have all known, my dear friends, what have been my habits, late in the evening night after night; and I do think it is not the duty of any man to regard his wife as a respectable housekeeper; I do not believe it is the duty of any man so to adjust his time in relation to social and public work as that he shall fail in the first duty, which is at home. Looking, therefore, upon the conviction that has lived with me while I have been in the Association; upon the step I am about to take; and also upon the strong conviction that there are thoughts in my mind that require nurturing in retirement and quiet, that there are forces that require disciplining, and that I do really want an education that I have not obtained;—these are the considerations that have led me to retire for a season from public service, to endeavour to mature thought, to watch, to pray, to educate myself, if I can, by God's grace, for any future services to which I may be called. Now, you have the whole of my reason, excepting that which would be too delicate to mention in a public assembly of this kind—the whole of my reason in the public and true sense of the term. I have felt that I have in a certain sense done the specific work I have had to do in the Association. I am not sure that my continuance in it would really be the blessing that some friends may contemplate; and I am certain that my conscience, my heart, in fact, all my moral nature, has its aspiration, and will only have its satisfaction when I am ordained to preach the Gospel, as I have desired to do from the time when I knew the Gospel. It is in the fulfilment of that desire that I am willing to lay aside a position of influence, of honour, and of usefulness, such as I think very few have been permitted to enjoy. I am willing to lay it aside just again to go to school and begin afresh, in the earnest hope that in acting, as I ought always to act, in simple obedience to the force of my spirit and the conviction of my mind, I shall, somehow or other, get to the end that I may not see, but an end of usefulness and blessing. My feelings so oppress me that my tongue will not go with its wonted ease, and I therefore will only add one or two words in the way of recalling to your minds some things that it has been my privilege to teach. You will bear me witness, my dear friends, that while I have been with you I have sought to magnify certain truths indefinitely. You will remember, that from the first address I gave at the first devotional meeting to the last address I was permitted to give in this room last Sunday afternoon, it has been my one solicitude to set before all who have come within my influence these distinct principles of God's word. First of all, we have acknowledged that the oracles of God are the sole authority before which men must bow; that we have our authority for all moral questions in the revealed word of God. You will bear me witness that I have always inculcated that the word of God and the *isms* of men are very often different matters, and that that word is to judge the *isms* or doctrines, and not those doctrines contract that word. You will bear me witness that I have sought to inculcate the love of God to sinners as being the starting-point of successful influence in Christian teaching; that man, having fallen, and being born in the image of Adam, and not in the image of God, God has pitied him; that He has given His Son to restore him; that reconciliation has been made by that Son, and that our life, our eternal hope, our joy, entirely depend upon that fountain of divine love in God, and upon the channel through which it has been manifested in the person and work of the Lord Jesus Christ. You will bear me witness that I have sought to show the importance, as well as the indispensable necessity, of the new creation of the heart by the Holy Ghost. You will bear me witness that I have sought to teach that things that are near to us are our duties as Christian men. I have not been one who has inculcated the study of unfulfilled prophecy. I believe that young men have very little opportunity or very little fitness for such questions, but that they will find comprehended in the obedience to Christ the whole of duty; that if they will only work out their faith and love in the sphere of their daily calling, they will not be unfruitful or weak Christians, but in my judgment they will be most ready for Christ, come whenever He may. You will bear me witness that I have sought also to inculcate the great wisdom of gentleness of judgment in relation to the motives and character of other men. I have ever said, Judge yourselves most severely, but others most charitably and kindly. I have sought in this simple and informal manner to indicate what I have believed to be the substance of my teaching. You will find that there is not much beyond what I have stated that I have tried to teach: no great things, but little things; the sum of the littles making the truly great. We have not asked you to go into the region of the stars, but into the region of daily life, into the region of living hearts, and of the sorrows and joys of your fellow-men, and to keep there. And if you will permit me just one farewell word to you, my dear brethren, it shall be on that one topic. Let me ask you, as I am now about entirely to relinquish the most privileged position I have ever held, to bear in mind what the Association was started for, what has been its great business, and what the particular department to which its business has been directed. Now, if you will each of you endeavour to understand that, you will find it will comprehend your personal salvation, your relative usefulness, and the continued application of the principles of the Association in the domain of commercial life. From my heart do I pray that God's benediction may continue upon every member of the Association, and upon every individual present. I cannot take leave without deep emotion when I think of the friends I am about to separate myself from in outward action. When I look to your Chairman, than whom there is no man in the city of London whom I more revere and love than he—for there are not two George Hitchcocks, there are not two Samuel Morleys—when I think that it was my privilege at the beginning to ask both of them to help me in this work, and they both most readily consented, and from that hour to this have been two of the most kind, generous, firm-hearted, and ready friends, I cannot tell you what I feel in the thought that I am about in outward circumstance to separate myself from two such men. I could not tell you the very many ways, privately, in which they have helped the Association in being really friends to me. I make this acknowledgment of their kindness, and am only sorry that the state of Mr. Hitchcock's health prevents him from being here, and listening to the acknowledgment that I most readily make. In mentioning those names, shall I omit others? Why, my dear friends, you know it has been no part of my career to attach special homage to men because they have the gift of a long purse. I think it is one of the miserable features of very much of the religion of the age to let a long purse atone for almost any amount of folly. I have sought young men. It has never been my object to seek the friendship of those gentlemen to whom I have referred: it has been given unsought, and with a measure of kindness that I had no right to anticipate. They saw, I think, that I had a simple duty to perform, and was seeking to perform it in such a manner as that God might be glorified and the end contemplated served. How much do I thank such brethren as Mr. Westbrook, as my dear friend Mr. Maberly, as Mr. Williams, as

Mr. Shipton! And if I were to go through the Committee there would be no exceptions—I should go through them all. I am thankful to say, that in the twelve years of our connexion not one that I should name has ever given me a single pain. If I have ever spoken a harsh, a thoughtless, an inconsiderate word to any one, I do from the bottom of my heart ask his forgiveness. It has never been my intention to wound; I may have often done it, and I now ask forgiveness from all present if I have uttered or done that which may have led astray or given a single pain. I do most earnestly rejoice that I have here present two friends whose names I have not mentioned (not because I do not value them), Dr. Gladstone, and his brother, Mr. Thomas Gladstone. How much I have appreciated their co-operation and their valuable help I cannot say. But really one's heart comes lifting up and so tumbles words out of the way that I cannot call up what I wish to express. I can only say that I leave the Association, I hope, without an enemy. There are many of its members with whom I have had perhaps such a difference of judgment upon some matters as that we might not agree; but that is none the worse, for really if I do not agree with any one he does not agree with me, and that is the law of toleration. Some one tells me that I am too broad; well then, I think he is too narrow; and I dare say it will be so to the end. My dear friends, I think very little about breadth or narrowness, so that a man has a living and a loving heart, so that he is rendering adoring homage to my Lord and Master, so that he cares for his brethren. But I do care if a man simply thinks for himself, and imagines that the pathways of life were only made for his peculiar crotchets or body. I think the pathway of life is like that beautiful Great Western Railway: it is that on which men of all countenances and classes must travel, and he is the happiest, and very often the most useful, fellow-traveller who will not take up too much room in the carriage, but just be willing to remember that he has but one-tenth of a compartment allotted to him. Now, there is the toleration which, in an Association like this, we must ever seek to exercise; not imagining that you are to have my views, or that I am to have yours: but we shall never be far astray if our eye be single, if our brow be unruffled in the consciousness of integrity, if our hand be open and our heart be warm. If, under whatever circumstance or condition, we are rendering homage to Christ, we shall certainly get pretty close to each other, in the degree of our fidelity to Him. That, my dear brethren, is my creed: and let me before I sit down just anticipate some comments that have floated in my ear. Some friends have said, "Well, Mr. Tarlton, I hope you are not going to turn High Churchman;" and others, "I hope Mr. Tarlton is not going to be a broad Churchman." I mention these things just to indicate to you that I think in things of that kind there is often a great amount of littleness. I have often heard of people saying, Mr. Tarlton is this, and Mr. Tarlton is the other: but they have never had the manliness or the Christian kindness to come and seek to recover Mr. Tarlton from the error they have thought him in, preferring to comment upon his errors behind his back. Let me say to you that I hope by God's grace I shall continue to be what I ever have been — a Churchman who thinks very little about churches of any sort or kind. I think more of life, and more of love, and more of the Lord and Giver of life; and wherever I may be I trust you will find that by God's preserving grace I shall be Henry Tarlton, a member of the Church of England, and, I hope, a devoted follower of the Lord Jesus Christ. I hope to be nothing less than that; and may God give grace that I may not be, and then I shall care to be, nothing more! And now, before I sit down, let me add one word about myself. There is one sentence in the word of God which I will use as an acknowledgment of your kindness; it is that in the Epistle to the Romans:—"I am a debtor." "I am a debtor to the wise and to the unwise." If I look at what I was when I began this work, and if I look at what God has really done, I can only say that I am first a debtor to the unmerited and free love vouchsafed to me; I am a debtor to the grace of God from beginning to end; I am a debtor to those gifted men who, possessing influence, station, and learning, have co-operated with me; I am a debtor to those who have bórne with my errors and with my infirmities — and they have been many; and how much shall I say I am a debtor to the unseen, yet not unheard prayers, it may be of hundreds of spirits, who have been behind the curtains of life asking for blessings upon one who has been seeking in some humble measure to do good to others. There is nothing that I am conscious of possessing but a simple heart, I hope, and a simple desire to do duty. My dear brethren, if I could transfer my motives, my disposition, to you, I would in this sense only. Think very much of duty. First think of your salvation; if it is not attained, think of it now; and, being saved, let the love of duty be the one consideration of your lives. I have an indescribable delight in anticipating the final time when we may meet. I thoroughly sympathise with Mr. Binney's most powerful comment upon the reception of this testimonial. What, think you, would be the case if, when the judgment of God shall be given, your opinion should be reversed? I can only look at that as calling my mind to anticipate the judgment that must come; and I will pray and labour, that when God shall speak, it shall be in testimony to the grace that He has given that has made me what I am.

Mr. WESTBROOK: — My dear friends, I shall not detain you long. I do not rise for the purpose of testifying to you (I need not do that), or to Mr. Tarlton, my love for that esteemed friend; but I rise as a matter of business in connexion with this Association. Mr. Tarlton is leaving us, but the Association remains; and on behalf of the Committee, I beg you to remember that the Association-work has still to be done. The Committee believe, as they have ever felt, that they enjoy the confidence of the members, and that has been at all times our support and our life. Mr. Shipton has the fullest confidence of the Committee. We think it only right on this occasion, as the past is waning away, and the future is coming on, that we should let you know, distinctly and definitely, that he has our fullest and most perfect confidence. We, of course, have seen more of him than any of you; and I believe I may say, on behalf of every friend on that Committee, that the more we have seen of him the more we have loved him, and loved the image of the Saviour in him. And let me just say that nothing has increased my respect for Mr. Shipton more than seeing how ready he was at all times to put Mr. Tarlton forward — how content to be second to him. But we do not depend on Mr. Shipton; we depend on you. Mr. Tarlton retires; other friends, who were on the Committee when I first joined, have retired from ill health or other causes; and we want brethren to take their places. We have always found this principal difficulty — to secure men fit for the work, and who would do it. Do think the matter over. We do not want to take you from other spheres of duty; but we want, especially, young men who have been converted by the Association, to pray, to think, and study to understand the principles of the Association, and then to place themselves in the hands of their brethren; and, when they are asked to pray or speak, to do it in God's strength. Remember, though Mr. Tarlton is going, we have got Mr. Tarlton's God and Saviour left. We have always been extremely anxious not to depend upon men. When, for instance, our friend Mr. Binney has been going to lecture at Exeter Hall, we have depended upon our pleadings with God in the Committee, that he might be blessed and guided to say that which is right; and we have been delighted to know that God has so fully and constantly answered our prayers. We rely, therefore, upon your working with us and upon your earnest prayers. If there are any Christian young men present who are doing little or nothing for the benefit of their fellow-creatures, let them come here, and I am sure our friends will find them plenty to do. Mr. Tarlton referred to names. I almost wish he had not, because I think the best friends he has had have not been some of those whom he has mentioned, but those who have attended here at the Bible-classes Sunday after Sunday, and at our Thursday evening meetings, interesting themselves in the young men with whom they come in contact; these have done good service indeed. I cannot find out what a young man is without a good deal of explanation; these friends know all about him; they find out, perhaps, that he wants decision, and they get closer to him and lead him gradually to God. Then our friend, Mr. Tarlton, has memorials in heaven. I could tell you of many an one whom the Committee have rejoiced over as having been spiritually born under his teaching, and whose death has been triumphant. These are right kinds of memorials to get, and there is not a young man here who may not get them if he will come forward in God's strength. I well remember, when in Gresham Street, Mr. Williams pointing out to me, with tears in his eyes, a young man going downstairs, and saying, "That is one of my children." My dear friends, if you should be able to say the same of any young man over whom you may have had any influence, what joy and delight will you feel! If Christian men and women could but feel it, how earnest would they be in the work of gaining souls for God! Let me beg of you, then, to give us your support in every shape and form, and your kind Christian co-operation whenever you can bestow it.

THE CHAIRMAN:— I think I can undertake to say for the young men assembled here to-night — and I am sure I can say it from my heart — that Mr. Shipton shall receive from us the most hearty, loving sympathy. Let me say also, no less from my experience of his connexion with this Association than by the fact that he is following a friend whom it is not so easy to follow, that on every ground I shall be thankful to afford him any form of co-operation which he may desire from me.

The Rev. EBENEZER CORNWALL, of Highgate, offered prayer in conclusion, and the proceedings terminated.

The Testimonials consisted of an elegant Silver Inkstand, and a pair of Candlesticks, manufactured by Savory of Cornhill; and of a Purse of 525*l.*, *since augmented to* 565*l.*

On the previous Sunday afternoon, the young men attending Mr. Tarlton's Bible Class presented him with a valuable selection of works — chiefly of Biblical illustration.

London:—Printed by G. BARCLAY, Castle St. Leicester Sq.